# CIVIL ENGINEERING

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# The Engineer's Opportunity to Serve Society

*By* Ralph B. Wiley, M. ASCE
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In 1934 the Society for the Promotion of Engineering Education published the report of the Investigation of Engineering Education made under the direction of Dr. W. E. Wickenden, now President of the Case School of Applied Science. In his final report Dr. Wickenden says, "It may be relevant to consider what a corporate profession is and what its social responsibilities are. . . . All recognize that some of the attributes of a profession pertain to individuals and some to groups, but there is considerable variation in emphasis given." The report continues, presenting a carefully prepared statement of professional rights and responsibilities based on several years' study by a very competent group of engineering teachers and executives.

To what extent does the average engineer enjoy the rights, and to what extent does he accept the responsibilities of professional status? In too many cases the engineer is concerned solely with the technical solution of the particular problem with which he is confronted. He leaves the exploitation of his work to those whose interest lies solely in the profit motive. He makes little out of it for himself but he does not see to it that society—and not individuals alone—benefit.

### CONTROL EXPLOITATION

A good example of this is the early development of the railroads in this country. They were built by engineers but they were managed and exploited by big business men, financiers, for their own benefit rather than for service to the public. There is no objection in having a new enterprise show a profit to the promoter, but the manipulator who produces nothing should not be allowed to profit unduly at the expense of the public.

The prime consideration should always be service to the public. The passage of the Securities Exchange Law has prevented such manipulation as milked the early railroads of their assets, and other legislation now insures their operation for public benefit, but we still have a long way to go in the development of engineering projects to insure full protection of the public against exploitation.

> *"The world of science andt echnology is one in which an adequate religion is most urgently needed . . . . Attention to the fundamental problem of ethics is the supreme demand of an age of science. Technology supplies the motive power. Organized industry and government constitute the control and steering mechanism. But who will tell us where to go? . . . . With our divided counsels, an efficient social evolution will not let us survive in competition with nations or social groups that know where they want to go. Our formal religious organizations offer just such divided counsels."—Arthur H. Compton, of Washington University, in "Sigma Xi Quarterly," April 1941.*

The engineer should obtain more control in engineering activities just as the medical men have gained control in their fields, and the basis of this control should be public service. The technique for this control is organization in professional societies. Effective action in a democracy can be accomplished only by organization; witness the strength of labor organizations or the various blocs in Congress.

Engineers should seek to gain for engineers control of the engineering activities of society for the real and avowed purpose of improved management in the interest of society. The failure of engineers to take a prominent part in business or politics is not chargeable to the public but to the narrowness of the engineers' vision. Among us, diligence, technical ability, integrity, and reliability have been held high, while qualities of leadership have been held low. It is of course admitted that the engineer should always do his best on any project for which he is responsible. Whether he does so is sometimes open to question.

### PRESTIGE NEEDED

Engineers as a body are delinquent in advancing their profession in the public understanding. Perhaps they are too modest and shun publicity. Nevertheless, the public is entitled to be informed on engineering matters and the information should come from those who are best informed. It is interesting to note that the American Society of Civil Engineers has recently created a public relations bureau with a full-time director, the purpose of which is to inform the public on the engineer's work. This is a progressive step for the Society to take, yet it would seem that such an agency should have behind it the full support of all engineers rather than of one group. If engineers are to make an imprint on social affairs or politics they must present a united front. Separate professional organizations can be and have been effective in each professional field, but only in union will real public strength be manifest.

The great mass of engineering literature is evidence that as a class engineers are generous in sharing their knowledge, yet there are many who have new knowledge and do not share it. This comes more from inertia and a lack of facility in expressing themselves than from an unwillingness to share that knowledge. The only way to learn to write well is to write, and the only way to become articulate is to speak out. Far too many of us are inarticulate. It may be that we are too shy, retiring, or possibly mentally lazy.

PUBLIC SERVICE

Most engineers are willing to serve the public gratuitously on various public boards and commissions, but in the past all too few have been appointed to such positions. It would seem that we should be more active in promoting the appointment of engineers to public bodies, at least to those that have to do with engineering matters or where engineering training is an important asset.

Engineering education has not received the support from the professional engineer that it should. Aside from the work of the Engineer's Council for Professional Development, particularly in accrediting engineering curricula at the various colleges and universities, very little assistance has been given. The profession certainly has not had a "constructive share. . .in ordering education," as has been the case in the medical profession. This has been due to inertia, lack of interest, and lack of cooperation and organization on the part of the professional societies.

Engineers have not supported our licensing laws the way they should. Every competent engineer should be licensed if he expects the support of his profession, and he should be a member of and support those professional societies in his own field. He owes it to his colleagues to do this much.

In the matter of ethics most engineers have been very scrupulous. All our societies have set up satisfactory codes of ethics and most engineers know and observe these codes, but our methods of enforcing the codes on those not so scrupulous are neither efficient nor effective.

Engineers, like all other good citizens, should be interested in and take a part in the social, political, and economic life of the country. Certainly their point of view is as informed, logical, and valuable as that of the newspaper men whose editorials often mold opinion and policies.

SOCIAL BENEFITS

As engineers we are said to have been engaged in "the art of organizing men, and of directing and controlling the forces and materials of nature for the benefit of the human race," but there seems to be some doubt whether what we have done has always been of benefit to mankind. We have developed an industrial age in which we enjoy a standard of living higher than was ever attained by any other people, but in reaching that high standard we have neglected the social impact of many of the devices by which it was achieved. Industrial research has given greater control over environment; sanitary and medical research have increased the span of life; but research which will confer the same power of control over man himself, his emotions and his passions, has been sadly lacking, and lack of such control may well destroy civilization.

> *"To the desire to live for others we must couple the ability to live with others. Observe a group of three-year-old children and their inability to play with each other. Observe a debate in Congress as voices rise and recriminations are substituted for reasonable argument. Observe the breakdown of rational relations between nations and the outburst of that violence men call war. Why must this be? Simply because the art of living by the rules of reason is a difficult art which men have never taken the trouble to master. Science, or the application of reason to the solution of problems, we have in the physical world. But to speak of the half-hearted study of human conduct as "social science" is grossly misleading. Social prejudice we have in abundance. Social science is waiting to be born."—Lewis Paul Todd, of Danbury State Teachers College, in "School and Society," October 27, 1945.*

If we continue our division into antagonistic groups either locally, nationally, or internationally, we are bound to fail because both experience and theory show that those social groups which work together have superior strength. Knowledge becomes an agent of destruction when men divide into antagonistic groups. Thus the inevitable end, if we are to survive, is as till more closely coordinated and cooperative society.

We obtain needed supplies throughout the world, and changes in the economic life in various parts of the world affect all of us. That we need larger political and economic units is demonstrated by the present turmoil. Man is being inevitably forced by scientific progress into some kind of a world government.

Will this affect our freedom? Freedom is a relative term. There is no freedom without restraint. The only free man is one who is entirely isolated, without any contact with his fellow man. The minute he joins with another the freedom of each is limited by the rights of the other.

Science itself can never destroy anything—only nature and man can destroy. We must be concerned, therefore, lest man prostitute science to evil ends. It is inconceivable that normal, thinking people would want to make the world worse rather than better.

Nevertheless, in anticipation of such an emergency, scientists are responding. We are witnessing something new under the sun: concentrated political action on the part of a large group of scientists (those who perfected the atomic bomb) to persuade society not to abuse, not to permit unwise exploitation, but to use wisely, a great scientific invention. The advice given by these scientists is speedily to adopt such revolutionary changes in the organization of society as only the most reckless politicians would dare to speak of, but which the thinking of political scientists and liberals of all shades of opinion has been steadily approaching for centuries—world government and state control of a great new source of power.

AGREEMENT NECESSARY

Engineers can take courage from the example of these hitherto little known physicists and chemists and also speak their minds, if they can agree among themselves, for the guidance of the people. Hitler was able to gain control of Germany because of the indifference of the educated people to his philosophy and because he substituted the worship of the state for a true religion.

We cannot continue to accept the "status quo," an intellectual retreat for the indolent, the mercenary, and the too successful. The Victorian philosophy that "God's in His Heaven," and if you leave things as they are all will be well, will no longer serve. We must develop a passionate desire for the good and a hatred of evil. But even that is not sufficient unless we are discriminating enough to ferret out the evil. Practical business men, statesmen, politicians, and even scientists have seen in the past in science—for example, in the industrial revolution—sure proof of the progress of mankind. They have been satisfied with this physical progress without too much concern for the moral and ethical progress with which it should go hand in hand. Now we have been through a war so evil, so diabolical, that we are forced out of our lethargy.

The engineer must be concerned with statecraft not only for his own salvation but because it is now dealing daily with problems which are his direct concern and which his training fits him to solve. Into our social and political life a different type of thought must be injected, a type based on the scientific method and on the cooperation of the many.

Although much more difficult of solution, the problems of society will yield to the same methods as do those of the scientist—the patient gathering of admitted facts before the formation or exploitation of elaborate theories. We must honestly learn to distinguish between facts and opinions, because only on facts can we base the scientific method of analysis which will result in agreement.

Politics has been a matter of emotions rather than of intellect. It is amazing how a sentimental appeal to a prejudice can blind us to its triviality and lack of truth. Scientific research has greatly improved man's ability to communicate with his fellow man, but it has in no wise improved the things said over these improved communication systems. Lack of independence of thought and intelligence of action is not a shortcoming of the masses alone. The daily press reports the "miracles" of science, but a dilettante interest in such reports is far different from a genuine understanding of the fundamental methods of science. Possibly a widespread teaching of science, with emphasis on the method rather than the "miracles," will ultimately contribute much to the thinking and intellectual attitude of the voter. Along with this must go the spiritual and moral improvement of men through culture and religion. This, however, is an evolutionary process and will not serve in the present emergency, which demands immediate action. Scholars, scientists, engineers must take a hand or the people will listen to demagogues and will become the willing tools of dictators.

The engineer is under an obligation to inform himself on the political, economic, and social trends of the times and take his part in the solution of our common problems. In a democracy, where the majority control, isolated individual influence is of little value. It is only by cooperation that good works are accomplished. That engineers have been unable to cooperate with one another in the public interest is a reflection on the profession. We certainly cannot hope to make an imprint on society if we continue to let petty differences and personal prejudices interfere with proper organization and cooperation.

Engineers properly organized can and should make their influence felt in all matters of public policy where technical abilities are needed in these difficult days.

# Ohio River Valley Water Sanitation Compact

*By* F. H. Waring, M. ASCE

Chief Engineer, Ohio Department of Health, and Secretary,
Ohio River Valley Compact Commission

DROUGHTS of 1930 and 1934 in the Ohio River drainage basin forcibly brought to the attention of health authorities the necessity for curbing the sewage pollution of the river if it were to be preserved as a source of public water supply. It was feared that the difficulty of producing a safe drinking water during these two severe drought periods might become a regular problem in the dry-weather months of ordinary years if positive steps were not taken.

As a first step in protecting the health of the people utilizing the Ohio River as a source of water supply, the health department of each state along the river exerted considerable pressure on the several municipalities under its jurisdiction to modernize their water purification facilities. The publicity incident to convincing these municipal authorities of the necessity for so doing served to acquaint the public with the fact that the Ohio River was becoming progressively more polluted with sewage, and that the time had arrived for a concerted effort by all public authorities in the watershed to bring about uniform improvements in the quality of the river water by treating municipal sewage and industrial wastes.

Some of the facts presented to the general public were that nearly 5,800,000 persons in municipalities on the watershed discharged raw untreated sewage, and that an additional population of more than 2,400,000 discharged treated sewage into the main river and its tributaries; and that over 6,200,000 persons were supplied with water from the river and its tributaries, of which one and a half million were supplied with water from the Ohio River itself. It was further observed that not a single city along the main river throughout its entire length afforded any treatment of sewage with the exception of two small suburbs, one at Ashland, Ky., and one at Portsmouth, Ohio, totaling less than 10,000 persons.

Various civic organizations and the public press of the valley, under the leadership of the Stream Pollution Committee of the Cincinnati Chamber of Commerce, demanded that steps be taken toward a definite control and abatement of stream pollution in the basin. As a result of this activity, the 74th Congress of the United States adopted Public Resolution No. 104, approved June 8, 1936, authorizing the states in the Ohio River drainage basin to enter into an interstate compact for such control and abatement. Subsequently the Governor of Ohio, under date of August 5, 1936, requested the governors of the other states in the basin to appoint commissioners to negotiate an interstate water sanitation compact. A preliminary meeting of this delegation, representing six states, was held November 20, 1936. Among those appointed to the preliminary commission were the state sanitary engineers of the several states, who in turn called upon engineers of the U.S. Public Health Service to assist them in formulating the tentative draft of an agreement.

### COMPACT PREPARED

Formal meetings of the delegates appointed to negotiate the compact began in January 1938, following official appointments pursuant to acts of legislatures. Each state was represented by five commissioners or delegates and, at the request of the delegates themselves, the U.S. Public Health Service was also represented at each meeting. Four formal meetings were held during 1938 and many subcommittee meetings, resulting in the publication of a report dated October 11, 1938, recommending a definite compact known as the "Ohio River Valley Water Sanitation Compact," embracing the states of Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee, and West Virginia.

This compact was modeled along lines similar to those of the interstate sanitation compact between New York and New Jersey, adopted in 1936, and known as the Tri-State Compact. (It includes Connecticut, which however has not yet adopted it.) The Ohio River Valley Water Sanitation Compact provides for a governing commission to consist of three commissioners from each state and three commissioners representing the U.S. Government. This commission is empowered to employ suitable legal, clerical, and expert assistants to carry out the provisions of the compact. Article VI sets up certain minimum requirements with respect to the treatment and discharge of municipal sewage and industrial wastes.

The minimum requirement for municipal sewage treatment is the removal of not less than 45% of the total suspended solids, based upon a yearly average performance. However, a further provision of Article VI states that "in order to protect the public health or to preserve the waters for other legitimate purposes . . . in specific instances such higher degree of treatment shall be used as may be determined to be necessary by the Commission after investigation, due notice and hearing." Likewise, in the same article appears a statement relative to industrial wastes, as follows: "All industrial wastes discharged or permitted to flow into the aforesaid waters shall be modified or treated, within a time reasonable for the construction of the necessary works, in order to protect the public health or to preserve the waters for other legitimate purposes, . . . to such degree as may be determined to be necessary by the Commission after investigation, due notice and hearing." It will thus be seen that it is the intent under this compact to measure each municipal problem separately according to the merits of the particular case, at the same time establishing a minimum degree of treatment of municipal sewage for the entire basin.

### STATES ADOPT COMPACT

During sessions of the several state legislatures in 1939 and 1940, the compact was adopted by the following states:

| STATE | DATE OF ADOPTION | RESERVATIONS |
|---|---|---|
| Indiana | March 4, 1939 | No |
| West Virginia | March 11, 1939 | Yes |
| Ohio | May 29, 1939 | Yes |
| New York | June 8, 1939 | No |
| Illinois | July 22, 1939 | No |
| Kentucky | March 16, 1940 | No |

In adopting the compact Ohio made a reservation requiring adoption by New York, Pennsylvania, and West Virginia before the compact would take effect and become operative for Ohio. West Virginia also made a reservation requiring adoption by New York, Pennsylvania, Ohio, and Virginia. The inclusion of Virginia in West Virginia's legislative action was anticipated sufficiently to permit each of the other states to add to its enabling legislation a clause consenting "that the state of Virginia may become a party to and a signatory state of the aforesaid compact as fully as if it had been expressly named therein."

All compacts between states, in accordance with the provisions of the Federal Constitution, must be ratified by the Congress of the United States. Accordingly, at the 3rd session of the 76th Congress, an act known as Public Resolution No. 739 was approved on July 11, 1940, "granting the consent and approval of Congress to an interstate compact relating to control and reduction of pollution in the Ohio River drainage basin."

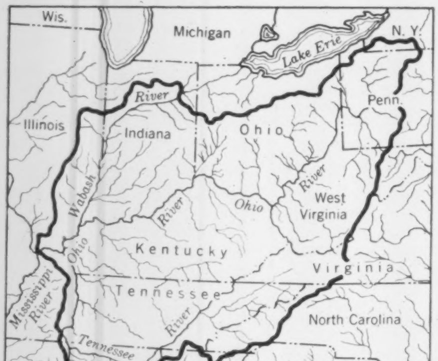


FIG. 1. AREA INCLUDED IN THE OHIO RIVER VALLEY WATER SANITATION COMPACT

Efforts to get Pennsylvania and Virginia to adopt the compact were interrupted by the war effort. However, anticipating postwar public works construction programs, an early renewal of such efforts was undertaken by the delegates appointed to negotiate the compact in a conference held at Pittsburgh, Pa., December 7, 1944. Subsequently Pennsylvania, at the 1945 session of its general assembly, adopted the compact on April 2, 1945, with the reservation requiring adoption by New York, Ohio, and West Virginia and the further reservation that "no project shall be authorized or required thereunder until the conclusion of hostilities of the present war." The Virginia General Assembly had no regular session during 1945, but at a special session the adoption of the Ohio River Compact was briefly considered; the decision was reached to defer definite action until the regular 1946 session.

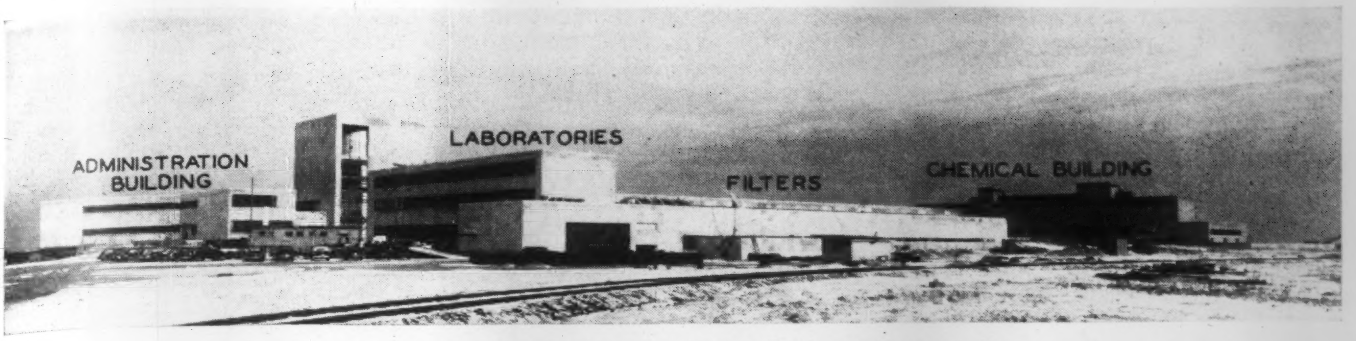
Active steps looking toward formal operation of the compact have recently been taken by some of the states. For example, the Pennsylvania Sanitary Water Board began early in the summer of 1945 to issue orders to municipalities and industries requiring plans to be prepared for the necessary sewerage and sewage and wastes treatment works; many recipients of such orders have proceeded to prepare such plans. Generally these orders have indicated the date of compliance as July 1, 1946; however, an extension of this compliance date by three months has recently been announced. Indiana has taken similar steps in a number of instances involving Ohio River municipalities and industries.

Since the fall of 1945 the Ohio Department of Health has made a concerted effort to correct stream pollution in the valley of the Mahoning River, an interstate stream rising in Ohio and flowing into Pennsylvania, where it joins the Shenango to form the Beaver River, a tributary of the Ohio just upstream in Pennsylvania from the Ohio state line.

Youngstown has received a loan of $25,000 from the Federal Government which, together with local appropriations, will finance the preparation of plans for appropriate works. Consulting engineers are now engaged in these studies. Cincinnati already has funds on hand for the preparation of detailed drawings. Plans for one of the two plants at Cincinnati have been completed and plans for the second will shortly be under way. Preliminary negotiations have been made between Cincinnati and its suburbs regarding joint construction and operation of adequate sewage treatment works.

At Logan and Athens plans have already been drawn and approved by the department for sewage treatment works. At Nelsonville plans are in preparation. In the Miami Valley the city of Hamilton at the November 1945 election voted $2,131,000 for the construction of sewage disposal works, and engineers are about to be engaged to prepare the plans. At the November 1945 election also the city of Middletown voted $1,500,000 for the preparation of plans for sewage disposal works. At the same time Columbus voted $5,000,000 for sewerage improvements (Franklin County, $1,500,000) and $2,000,000 for expansion of the existing sewage treatment plant. Preliminary plans have been approved by the Department of Health for the expansion of the sewage-treatment works.

Summarizing, sewage treatment plans are in preparation or have already been approved for 14 Ohio cities in the Ohio River drainage area, estimated to cost $15,614,000.


ADMINISTRATION BUILDING
LABORATORIES
FILTERS
CHEMICAL BUILDING

General View of South District Filtration Plant at Chicago, Ill.

# Chicago's South District Filtration Plant Placed in Partial Operation

*By* W. W. DeBerard, M. ASCE *and* J. R. Baylis, Assoc. M. ASCE

Respectively City Engineer and Engineer of Water Purification, Bureau of Engineering, Department of Public Works, Chicago, Ill.

*Partial treatment of about 400 million gallons of water daily is the schedule at the new South Chicago Filtration Plant. Long held up by wartime priorities, additional equipment is expected soon to be ready for installation so that the complete modern plant can be put in operation. When this is done, about one-third of the water supply of Chicago will be treated at this plant, located directly on the shore of Lake Michigan. The source of this article was an address before the recent meeting of the Society's Sanitary Engineering Division in New York.*

With all Lake Michigan at its doorstep, the city of Chicago has no problem of water supply—as far as quantity is concerned. But quality is another matter. As is the case with most large cities, considerable amounts of industrial wastes, drainage, and assorted pollution find their way into the nearest surface water, in this case also the source of the drinking supply. The hazard to public health became so great that in 1938 construction of the huge South District Filtration Plant was begun. There followed years beset with difficulties for the construction men so that not until October 1945 could the plant be put in operation. Even then so much equipment was missing that only partial treatment was possible.

The part of the plant placed in operation provides low-lift pumpage of the water, chlorination, coagulation, and sedimentation. Soon the partial treatment will include the use of acid-treated sodium silicate and lime to provide more effective sedimentation of coagulated matter. The filters will not be completed until the fall of 1946, after which time activated carbon can be used for taste and odor removal.

The new plant, which supplies water to three high-pressure pumping stations in the South Water District of Chicago, is shown in Fig. 1. Water from Lake Michigan is now taken into the plant from a direct lake intake through thirty-four 6 by 8-ft gates. The intake basin is divided into two parts so that half of it can be dewatered while the other half is in service. Later this basin will be connected by tunnel to the Dunne Crib through a 16-ft raw water tunnel, as shown in Fig. 2. Then water may be taken from the lake at the crib or at the plant. Some saving in the cost of pumping results when the direct intake is used.

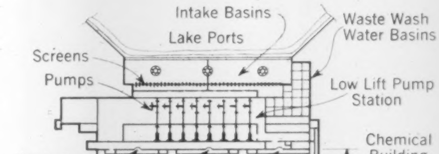

Intake Basins
Waste Wash Water Basins
Lake Ports
Screens
Pumps
Low Lift Pump Station
Chemical Building Over Mixing Basin
Venturi Meters
Mixing
Basins
140'
140'
140'
140'
140'
Settling Basins
Wash Water Conduit
480'
Gallery
Gallery
Gallery
Settled Water Header
Filters
20'
322'
Wash Water Pumps
Filtered Water Header
Gallery
Gallery
Gallery
Gallery
Temporary Flumes
By-Pass
Inlet
Outlet
Filtered Water
Reservoirs
260'
900'

Fig. 1. South District Filtration Plant, Chicago

Thirty-three screens, having a combined area of 3,000 sq ft, are located in the intake. The screens are wire mesh with $^7/_8$-in. openings. The large area of the screens is mentioned because there was considerable clogging trouble in October 1945, by *dichotomosiphon tuberosus*, a filamentous algae of rare occurrence. A smaller screen area might have clogged so rapidly that the screens could not have been left in place.

### SIX PUMPS IN OPERATION

Six low-lift pumps are in operation. Two other pumps and motors are installed except for electrical connections. Permission to install the electrical equipment for these two pump motors could not be obtained until near the end of the war. Four of the low-lift pumps have a rated capacity of 100 mgd each, and the other four have a rated capacity of 50 mgd each. The six pumps now in operation (3 of 100-mgd rated capacity and 3 of 50-mgd) exceed their rated capacity by about 20%, because of high suction head, and give a total pumpage of about 550 mgd.

Water from the low-lift pumps is divided into three separate flows and passes through three two-story mixing and settling basins (Fig. 3). Most of the chemicals are added in rapid mixing conduits just ahead of the mixing basins. From the settling basins the water passes to a common settled-water header and then to another header connected to the filtered-water reservoirs. Until the filters are ready for operation, the water will continue to be dropped from the settling basins to the filtered-water reservoirs, a distance of 12 to 14 ft. This represents the loss of elevation that later will be consumed in passing the water through the filters.

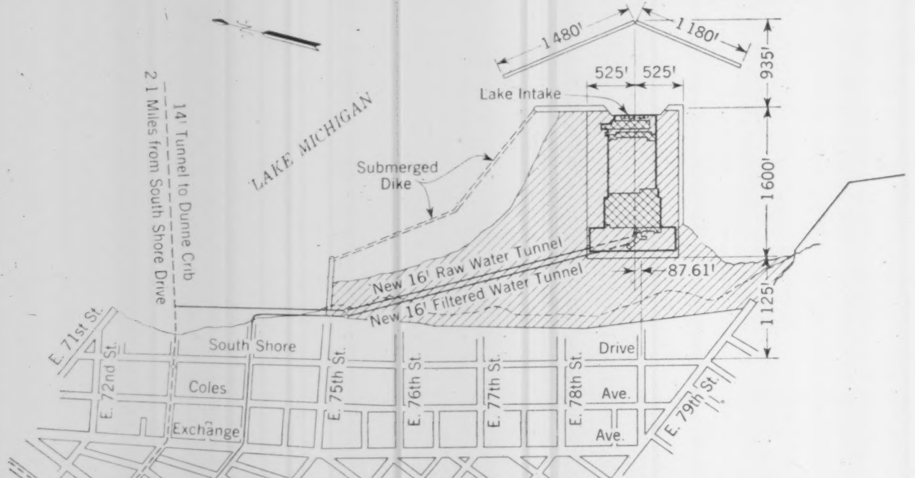

1480'
1180'
525'
525'
935'
Lake Intake
LAKE MICHIGAN
Submerged Dike
1600'
New 16' Raw Water Tunnel
New 16' Filtered Water Tunnel
87.61'
1125'
14' Tunnel to Dunne Crib
2.1 Miles from South Shore Drive
E. 71st St.
E. 72nd St.
South Shore
Coles
Exchange
E. 75th St.
E. 76th St.
E. 77th St.
E. 78th St.
Drive
Ave.
Ave.
E. 79th St.
E. 74th St.

FIG. 2. LOCATION OF PLANT ADJACENT TO INTAKE FROM DUNNE CRIB

The water leaves the filtered-water reservoirs through an outlet shaft 16 ft in diameter, which connects the reservoirs to the tunnel system leading to the pumping stations.

At the 335-mgd average water consumption rate of 1945, the mixing time is 50 minutes; the settling time is 3.6 hours in the settling basins; and there is another settling period of 1.2 hours in one of the two filtered-water reservoirs. The rate of flow is measured by three venturi meters located between the raw-water conduits and the mixing channels.

### CONTROL OF PUMPING

At present it is deemed advisable to keep the gates at the Dunne Crib open so that in case of a shutdown of the filtration plant, or reduction in the flow below the consumption rate, water will continue to flow to the three high-pressure pumping stations. The plant has now been operated through a winter period and there was some ice trouble. The full pumpage demand could not be met for several hours on one day, and about 35 million gal of water had to be obtained through the crib intake. This procedure of having the lake ride on the tunnel system increases operation difficulties since there must be close regulation of the pumpage rate to follow the consumption rate.

To have no water flowing to the city through the Dunne Crib, the pumping rate at the filtration plant must be maintained slightly greater than the high-pressure pumping rate, so that there is a slight flow backward through the Dunne Crib to the lake. Frequent telephone communication with the pumping stations to obtain the pumping rate and the predicted pumpage for the next hour enables the filtration-plant pumpage rate to be set only slightly in excess of consumption.

To have no flow between the Dunne Crib and the filter plant, the water in the connecting tunnel must be maintained at lake level. Thus, the water level in the filtered-water reservoir must be high enough above lake level to equal the friction loss in the 16-ft tunnel between the plant and the point of connection to the 14-ft Dunne Crib tunnel. When the consumption of water is lowest, in the early morning, the filtered-water reservoir level is likewise at its lowest level. As consumption increases there is greater friction loss, and it is necessary for the filtered-water reservoir level to be raised. The operators therefore have to predict when the consumption rate will increase, and increase the pumping rate at the filtration plant in advance to prevent water flowing in to the city from the crib. At the maximum consumption rate, the level of the filtered-water reservoir is at its highest, which is about 2 ft above lake level for a 400-mgd rate.

As the consumption decreases in the late evening, the level of the filtered-water reservoir drops and some water in excess of the low-lift pumping rate flows from the plant. To further complicate maintenance of correct levels, the flow in the flumes leading from the settling basins to the point where it is dropped down into the filtered-water reservoirs also varies and causes a variation in the level of the water in the flumes, which likewise causes variation of the water levels in the settling basin.

The third factor influencing the flow is the fluctuating lake level. A sudden change in the direction of the wind or a rapid increase in its velocity can cause the lake level to vary over one foot in a few hours. It should be evident that all these conditions require much adjustment of the low-lift pumping rates, and considerable forethought in predicting consumption. Much work on each shift in the control station consists of making the various telephone calls and calculating the low-lift pumping rate necessary to maintain the proper flow to the high-pressure pumping stations.

The plant control station and the control laboratory are located in the chemical building. Four employees are on duty at these stations all the time. Two are engaged in plant control work. In addition to performing the duties mentioned in the previous paragraph, they give orders to the operators for changes in pumping rates and chemical dosages. One of these two is the Chemical Control

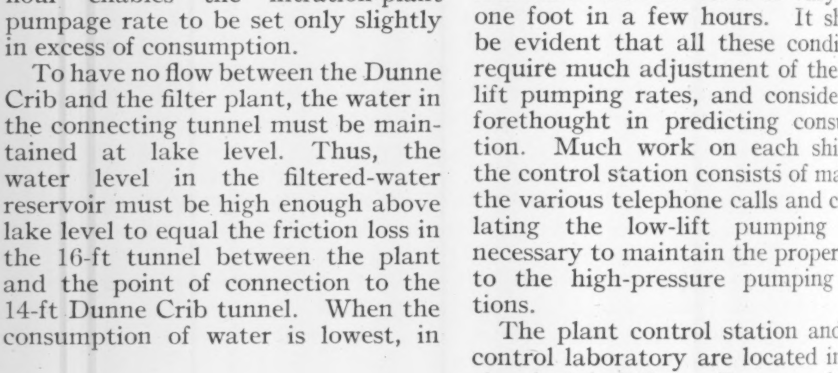
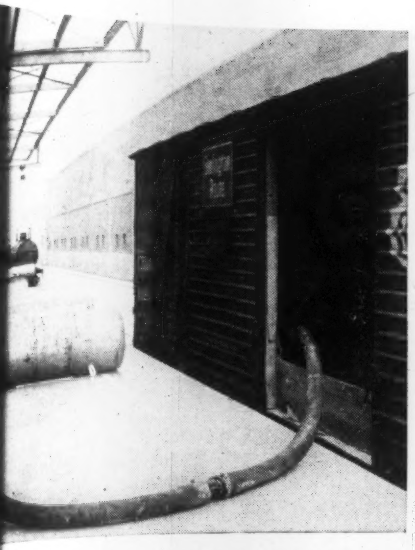
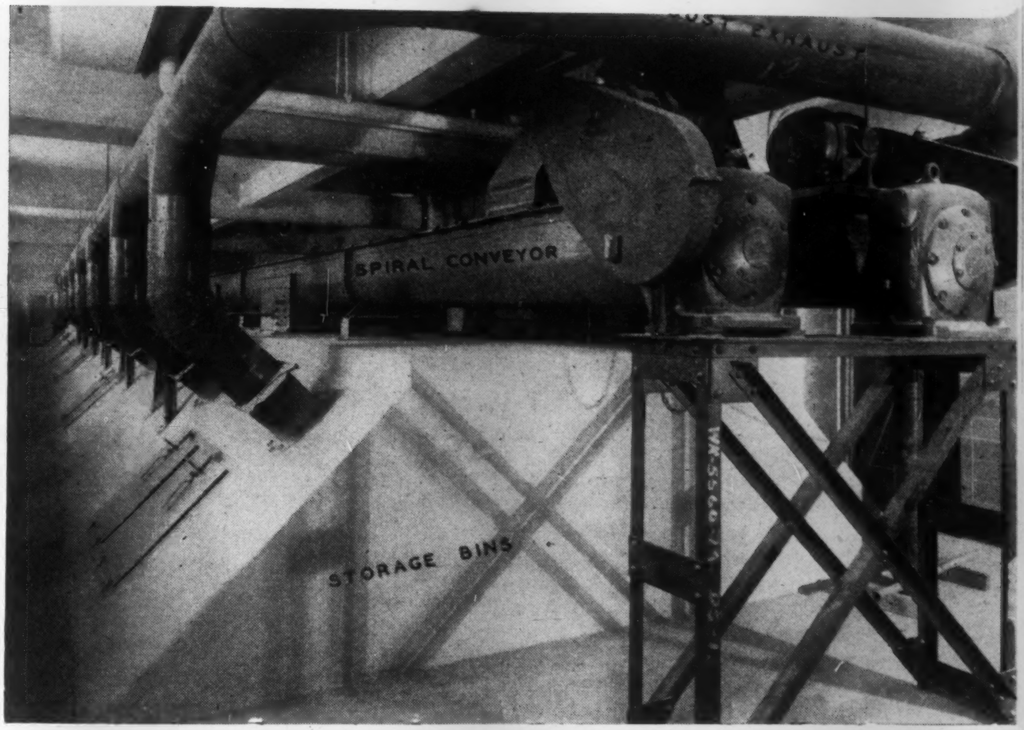

Aluminum Sulfate
Pneumatic Receiver
Dust Collector
Activated Carbon
Sulfuric Acid
Acid Scale
Sodium Silicate
Pneumatic Unloader
Chemical Feeder
Observation
Solution Box
To Low Lift Pump
Raw Water Conduits
Baffled Channel
Settling
Basins
Rapid Mix
Venturi Meter
Slow Mixer
Rock
Sediment Scrapers
Pipe Tunnel

FIG. 3. SECTION THROUGH CHEMICAL BUILDING AND MIXING BASINS OF FILTRATION PLANT





Chemicals for Treatment Are Handled by Conveyors from Railroad Cars (Above) to Storage Bins (Right)

Engineer, who occupies an important position in the plant, for he calculates the chemical dosages for the feeding equipment. The rate at which to set each chlorinator in use is given to the chlorine attendant in pounds per hour. The Chemical Control Engineer also gives the feed rate at which to set each dry-feed machine used in applying aluminum sulfate and other chemicals. The second employee in the control station keeps in close contact with the pumping stations as to the pumping rate at those stations and the prediction of the rate for the next hour. He also obtains reports of the residual-chlorine tests made hourly, or more frequently, at the high-pressure pumping stations served by the filtration plant.

The third employee is a chemist on duty in the control laboratory, whose duty is to make the necessary chemical tests on the water. These include residual chlorine tests on samples of water collected at several places within the plant; turbidity tests on the raw, settled, and plant-outlet water; odor tests on the raw and plant-outlet water; and other essential tests such as for pH, temperature, and alkalinity. The fourth man collects water samples. Since the water passing through the plant is divided into three separate flows, the sampling and testing is almost the equivalent of that required in three large filtration plants.

At the time of this writing (April 1), the main chemical treatment is chlorination and coagulation with aluminum sulfate. An acid-treated sodium silicate is being used to a limited extent. The silicate solution has to be prepared at the plant and involves close chemical adjustment. A small amount of lime is being used at times. The ammonium sulfate equipment is installed and will soon be put in use.

Eleven of the fourteen chlorinating machines are in operation. The other three are installed temporarily in high-pressure pumping stations. After a few months' operation of the filtration plant, these machines will be moved to the plant.

### CHLORINE DOSAGE

Present practice is to add sufficient chlorine to the water just ahead of the three venturi meters at the mixing basins to produce residual chlorine of at least 5 lb per million gal in the water leaving the plant. The dosage of chlorine necessary to obtain this residual varies from 10 to 20 lb per million gal. Close control of chlorination is maintained because much now depends on the effectiveness of the chlorine to produce a water of suitable bacteriological quality.

Should insufficient chlorine be applied in advance of the raw-water meters, an additional amount is added in the outlet shaft of the filtered-water reservoir. Later most of the post-chlorination will take place in the filtered-water header leading to the reservoirs.

Prior to the installation of the full number of residual chlorine recorders, a large number of samples are being tested daily for residual chlorine. At points immediately behind those where the chlorine is added, the water is sampled every thirty minutes. This requires three samples of water for there are three mixing basins and three separate points for the application of chlorine. The mixing-basin effluents are sampled hourly, and since the water has been divided into an upper and a lower flow, six samples of water are required. The water is again sampled as it passes through the two temporary flumes by-passing the filters, and again at the outlet of the filtered-water reservoirs.

Since the residual chlorine usually is too high for accurate testing with orthotolidin, the starch-iodid method is used. This test is fairly accurate for high residuals.

The chlorinating plant at the Dunne Crib, installed in 1936 to treat the highly polluted South Side water, still is maintained in operating condition. A small amount of chlorine is continuously passed through some of the machines to keep them in working order. This chlorine is wasted but the practice is regarded as a justifiable safeguard in the initial stages of operation of the filtration plant. Up to April 1, 1946, there have been several short periods in which water has been taken into the system through the Dunne Crib. A minor accident to the electrical switch gear caused all the pumps except two to be shut down for a period of several hours. Ice trouble caused some water to be taken in at the crib on two occasions. Each time chlorine dosage was increased in proportion to the flow of water through the Dunne Crib intake and there was no lowering of the amount of residual chlorine at the pumping stations. Each of the three high-pressure pumping stations also has chlorinating equipment, and while the drop in residual chlorine did not require this equipment to be placed in service, some of the machines in each station were operated on minimum dosages for a few hours.

The coagulating chemical is aluminum sulfate. It is purchased in bulk in carload lots, unloaded with

ONE OF FOUR FILTER GALLERIES UNDER CONSTRUCTION

pneumatic conveyors, and stored in concrete storage bins in the chemical building (Fig. 3). The bins discharge either directly into weigh-hoppers or into spiral conveyors, which carry the material to weigh-hoppers not directly underneath the bins. Each weigh-hopper connects to a dry-feed machine. At present there are six aluminum sulfate dry-feed machines, two for each mixing basin. Each machine has a capacity of 700 lb of aluminum sulfate per hour. After passing through these machines, the alum is dissolved in solution boxes that are agitated with high-speed mixers; thence the solution flows to the rapid-mixing conduit.

More aluminum sulfate is used at present than would be necessary if the filters were in operation. The dosage usually is set at 100 lb per million gal, which is about twice the predicted minimum dosage after the filters are in service. This dosage is used for turbidities below 50. When the turbidity increases above this figure, a graph is available to determine the dosage.

### OPERATING PERSONNEL

The number of employees required to operate the completed plant will be about 145. All employees assigned to the filtration plant are under the direction of the Chief Filtration Chemist. They are divided into two general groups—one made up of technical and office employees, the other of operators, mechanics, and laborers.

The operators, mechanics, and laborers are under the Chief Operating Engineer. Certain operating employees, such as those operating the chemical feeding equipment, are under the Chief Operating Engineer in so far as their work applies to operating the equipment, but receive orders directly from the Chemical Control Engineer as to the chemicals to apply to the water and the points of application. This relieves the operators of responsibility for the chemical treatment other than to see that the equipment functions as intended.

Responsibility for the treatment and for computation of the chemical dosages therefore is placed on employees specially trained for such work. Technical employees are instructed not to attempt to operate any of the equipment. This produces a distinct division of the work and responsibility and so far has resulted in good cooperation between the two groups.

A good system of reports is a valuable asset in the operation of any plant. Our reports are in process of development and some are in approximately their final form. Since the water at present is only partially treated, some of the forms will not be used until the plant is completed.

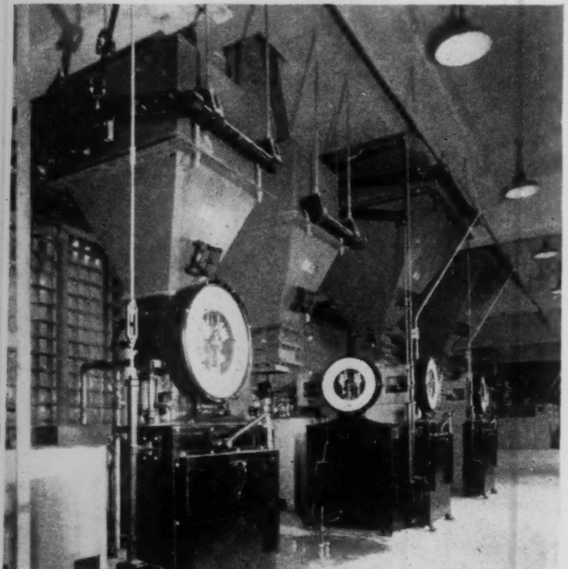
The Chemical Control Engineer gives the orders for changes in pumpage rate and changes in the dosages of chemicals. The laboratory, through the Chief Filtration Chemist, determines the chemical dosages in pounds per million gallons. The Chemical Control Engineer calculates the setting of the various chemical feeding machines and issues written dosage orders to the operators. In a large plant with a number of employees engaged in operation, written orders become a necessity.

The operators record the weights of the chemicals used every hour on every machine in service, entering them on the work sheets. These weights are turned in to the Chemical Control Engineer as soon after the hourly readings as possible. Since all weights cannot be made simultaneously, the weights are read in the same order each time, so that the time between the readings on each machine will be almost exactly an hour. The laboratory has convenient sheets on which to record all tests conducted there.

A monthly summary of chemical treatment and water quality is prepared. This sheet is set up so as to provide for complete chemical treatment. Results from the daily log sheets are transferred to the monthly sheet the following day, except in the case of bacteriological tests, the results of which are known only after definite time intervals. The monthly sheet is kept where it can be inspected at any time; therefore the essential operating facts are constantly available in convenient form.

When negotiations with the War Production Board were under way for priorities on that part of the plant to provide low-lift pumping, chlorination, coagulation, and sedimentation, it was estimated that the improvement in quality, except for taste and odor, would be at least 70%. Reports for the four months of November 1945 through February 1946 show an average turbidity reduction of 76% and reduction of microscopical organisms of 80%. As a result of chlorination, bacteria are reduced 99.9%.

Operation of the South District Filtration Plant is a function of the Department of Public Works. Oscar E. Hewitt is Commissioner of Public Works, and H. H. Gerstein is Chief Filtration Chemist.



BATTERY OF CHEMICAL FEED SCALES

# The Engineer in Public Life

*By* Carl Hinshaw, Assoc. M. ASCE

Member of Congress, House of Representatives, Washington, D.C.

NOT infrequently engineers and other professional men in government service, from the municipal to the federal levels, make disparaging remarks concerning the elective officials under whom they serve. It is true that there are too many examples of ignorant but successful politicians in public office. But I am wholly out of sympathy with the type of remark I have mentioned.

Whenever I hear such a remark my first question is, "Why don't you run for public office? The people need men of your talents and abilities as city councilmen, county officers, state legislators or Congressmen—or whatever the office. You have no right to complain of that one's shortcomings unless and until you yourself have either submitted yourself to the choice of the people, or have done your utmost to see to it that another good man consented to run and was elected. Politics is just what good citizens permit it to be. Merely casting your ballot is not enough to square you with your duty as a citizen. Citizenship is a precious privilege that you must work at to deserve. If an ignorant or a bad man achieves public office do not blame him—blame yourself. He only seized an opportunity that you let pass. If an intelligent and good man achieves public office it is your duty to support him against all detractors and defamers."

### GOOD EXECUTIVES

Engineers make splendid executives in government, but rarely are they found in positions of highest authority. Those positions are most frequently held by lawyers. Why is that so? I think it is because lawyers are trained in public speaking and in thinking while speaking. They become resourceful proponents and opponents in debate. In addition to their basic training in the law they must achieve a widely diversified knowledge, even though it may only be a smattering of knowledge, in many other fields. The engineer on the other hand generally confines himself to intensive specialization in his chosen branch of engineering. He can be very interesting to a receptive audience in his own domain, but he is generally tongue-tied in public.

Many times I have pondered the reason why so few engineers offer themselves for election as officers of our local, state, and federal governments. The pat answer is that perhaps they are too smart to get caught up in the maelstrom of politics, but we must reject that answer because at best it could be only an excuse.

*"CITIZENSHIP is a precious privilege that you must work at to deserve." This thesis was developed by Congressman Hinshaw at the Philadelphia Spring Meeting of ASCE. In his address, excerpts from which are printed here, special attention was given to the direct participation of engineers in politics.*

Politics is indeed a churning maelstrom from which one may be dashed against the rocks of misfortune or drowned in oblivion. To be successful, one must be able to take the buffetings as they come and steer a steady course. Politics is far from being an exact science, and in many aspects it is not even logical. The logical, precise mind of an engineer is likely to shrink from politics as unworthy of his talents. That is where the engineer makes a great mistake. In avoiding politics he is depriving his community, his state, and his country of a type of leadership that is sorely needed.

The engineer is reared in the cloistered precincts of a drafting room or laboratory where hangs the admonition, "Silence—brains at work." He learns to express himself in the terse language of a written report—in precise figures and in neatly drawn lines. His imagination, his genius, is expressed in calculations made with infinite care, which flower on a drafting board, and bear fruit in the form of amazing new structures.

When an important public project is completed, a big dedication ceremony is held. The governor, the mayor, the board of public works, and prominent citizens of other degrees gather, and the wind instruments of a brass band cause the bunting and the banners to stream out proudly. A fine bronze plate is then unveiled to an astonished multitude proclaiming the names of the public officials under whose regimes the project was nurtured into reality. In relatively small type the plaque may perhaps mention the name of the chief engineer of the Board of Public Works.

Some of the engineers who stewed and sweated and refigured and redrew the plans for the project which was their brain child, may be found standing modestly in the background, wistfully enjoying the evidence of public pride, but wistful because the politicians have appeared to claim fatherhood of their brain child. So the engineer goes away, back to his cloistered precincts and conceives another brain child. That is his appointed mission in life, so he thinks.

But is the conception, design, and execution of projects the limit of his mission in life? I say no. If he limits himself to those things, the engineer is merely a servant of others in authority. To achieve his highest usefulness to our society, the engineer should himself achieve authority in the affairs of society. His highly trained hand, his resourceful mind, and his inherent integrity are needed in positions of authority, to direct the collective efforts of society—to avoid waste, to advance the most useful ideas, to quash the rash and harebrained ideas, to sway public opinion toward good works, to "run interference" for the advancement of the welfare of society.

### ENGINEERS MUST SPEAK OUT

What is the right road to a solution? Does it start in school and college? Of course it can. But instead of joining a debating society largely frequented by adolescent lawyers and preachers, who naturally choose purely political or ethical subjects for debate, the student engineer should join or create a debating society to engage in heated discussions on questions where his training will support his thesis. Question: "Should the New Jersey Barge Canal be built?" Question: "Should railroads be permitted to own and operate airlines?" Question: "Should the commerce of the highways be taxed for highway construction, or should the tax be upon the abutting property owners?"

There are thousands of such questions that should be debated by young and budding engineers. Each part of our country has important questions to decide that can be presented expertly by engineers. Let them learn to speak, and to speak out the truths they learn and know instead of modestly waiting to be consulted. People need to know such basic truths to guide them in their political expressions.

# What Can Be Done About Traffic Congestion?

## Off-Street Parking Facilities

*By* F. W. LOVEJOY

EXECUTIVE SECRETARY, JOINT COMMITTEE ON PARKING, WASHINGTON, D.C.

*DURING a recent joint session of the City Planning and Highway Divisions of ASCE, serious consideration was given to the ever-growing threat of traffic congestion to urban economics. The program broke up the problem into component parts, placing each in the hands of an expert. A statement of the overall problem and a detailed analysis of parkways and expressways were presented in the April issue of "Civil Engineering." Rapid-transit problems and a study of off-street terminals follow in this issue. The symposium will be completed in next month's number, where the subjects of traffic engineering and enforcement and city planning, zoning, and housing will be discussed.*

THERE is no denying that the establishment of suitable programs for terminal parking facilities requires the coordination of a variety of interests. Indeed the multiplicity of interests involved, and the individual and personal character of many of these interests, make difficult a wide public appreciation of the true place of terminals in the whole picture of municipal highway development.

It would not be far wrong to say that among nine out of ten automobile owners the solution of the terminal problem lies in the answer to the question, "Where am I going to be able to park my car?" Terminal facilities are thought of too often simply in terms of spaces for cars, or trucks, or buses. But the real questions are, first, how can parking terminals function to benefit a community, and second, how can a program be implemented that will bring these beneficial functions into play.

### DESTINATIONS AND RATES IMPORTANT

Functionally the parking facility exercises a very powerful influence on the pattern of urban highway transportation. Looming probably largest among the causes for this influence are the location of parking facility sites in reference to the purposes of trips by parkers; and the schedules of parking rates. Terminals may thus be made to function so as to attract the short-time business or shopping parker, and at the same time to discourage the all-day employee parker, who might be expected to reach his job by a mass transportation medium.

MOVING
UNITED STATES STORAGE CO

STAR PARKING PLAZA IN WASHINGTON, D.C., A PRIVATE OFF-STREET PARKING GARAGE

Admittedly the ownership of an automobile carries with it no inherent right to or priority on the occupancy of parking space anywhere. If, however, the owner or operator of the automobile is able and willing to pay a fair price for the occupancy of that parking space, in a downtown business and shopping center, for example, it presumably should be made available to him, that is if the classification of the automobile as a necessity of life by the Bureau of Labor Statistics is correct. If for any reason the needed parking facility is not available, because of construction cost or lack of proper site for instance, there should come into play a method of coordinating the community of interests previously mentioned, so that the desire of the parker, the advantage of the business house or department store, the preservation of urban property values, and the interest possibly of private parking enterprise can all be adjusted in relation to one another, and the functioning of terminal parking facilities be rendered effective.

What does all this mean? It means first that it is time for us to contemplate a straightforward approach to the solution of the municipal off-street terminal problem, and on the basis of coordinating the community of interests concerned. It may mean utilizing municipal credit to get cheap money; it may mean some relatively small loss of taxes; it may mean taking property by condemnation. There is nothing so terrible about all this, is there, considering the objective?

Laws are already on the statute books of about fifteen states authorizing the use of condemnation proceedings to take land for off-street parking facilities, and for other purposes related to the erection, regulation, and operation of such facilities. These laws are state-wide in effect. There is also another series of enabling acts in about fifteen other states, applicable to specified cities, towns, counties, and so on. Lastly, there is a third class of special laws covering parking facilities as to zoning, special tax districts, and various types of specific regulations. Thus considerable experience and plenty of inclination have already been exhibited in many states to accord parking facilities special legislative attention, and what is still more interesting, there is beginning to be an observable trend toward the plan of placing terminal facilities under a separate agency, or perhaps a separate division of an existing governmental agency for establishment, regulation, or control.

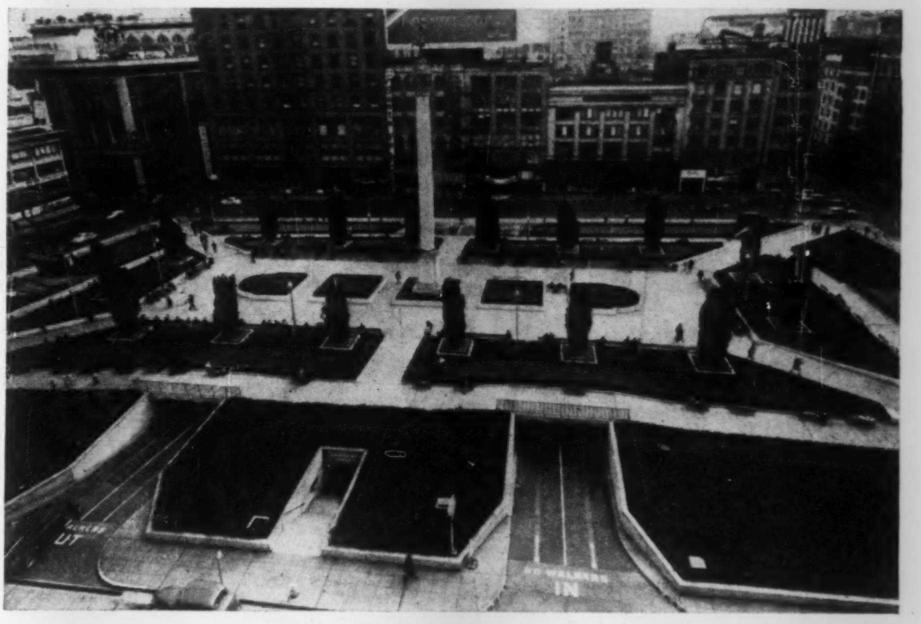
The positive approach toward the working out of the municipal terminal facility program should come under a separate agency or division of the city government. To have terminal facilities function as they must to get the results we want in our large cities, it is essential that facility programs be developed, regulated, and controlled by some agency of government which can devote itself wholly to the task, complicated and all-absorbing as it is. That is the only way, it seems to me, whereby the ever-present community of interests can effectively be harmonized in the interest of the community as a whole.

How much nearer are we than we used to be in the good old hit-or-miss parking days, to techniques and methods of analysis of data available to a municipal parking agency, which will guide it to accurate conclusions in making provision for adequate terminal facilities? The answer is, infinitely nearer—in procedure, in practice, in a fund of already assembled information.

So the parking agency or division of the city government can go ahead with a feeling of confidence to develop a program of terminal facilities capable of functioning as coordinators of a community of objectives, of which the following are typical.

1. *City as a whole:*
    a) Elimination of much street-traffic congestion, and freeing of the traffic flow
    b) Reduction of traffic hazards caused by congestion
    c) Speeding of fire apparatus and other emergency services through the streets
    d) Stabilization or even enhancement of property values and tax levels in congested sections
    e) Prevention of disintegration and scattering of principal business and shopping centers
2. *Downtown businesses, stores, theaters, banks, hotels:*
    a) Provision of terminal off-street space at suitable rates, in the right locations, as determined by parking demands generated by land uses
    b) Establishment of parking rate schedules, which will encourage the use and turnover of space by the short-time business or shopper parker
3. *Mass transportation facilities:*
    a) Establishment of parking rate schedules at levels which will be unattractive to the all-day worker or employee parker in the downtown congested section
    b) Reduction in the volume of traffic on streets in the congested areas of cities carrying mass transportation facilities
4. *Parkers of automobiles in downtown areas of cities:*
    a) More convenient location of parking facilities
    b) Establishment of proper parking rate schedules for desired results
    c) Improved, regulated operation of parking facilities to insure that parked vehicles will not be damaged
5. *Private parking enterprise:*
    a) Opportunity perhaps to lease municipally owned terminal-facility sites in the right locations for a long period of years
    b) Opportunity perhaps to buy municipally owned terminal-facility sites in the right locations at right prices
    c) Opportunity to lease as concessions municipally owned parking facilities

Cities are not all alike. Not every big city requiring a full-time parking agency should proceed to erect its quota of off-street parking terminals. Every encouragement should be extended private enterprise to build and operate facilities, and where large new structures, such as office



Unusual Solution to Parking Problem in San Francisco—The Union Square Garage

Vast Street-Level Parking Lot Accommodates Washington, D.C., Employees buildings or stores, are to be erected in the congested areas of cities, the matter of off-street parking might best be worked out satisfactorily in advance either by statute or agreement. It is to be expected that from now on municipalities will more and more require off-street loading and unloading of merchandise, freight classification and the like, and that over-the-road trucks or inter-city buses will operate through terminals outside the most congested parts of cities.

Our cities ought vigorously to push toward, first, an accurate analysis of parking terminal requirements, then second, an orderly effort through a specifically designated agency to correlate the various factors involved. Ultimately it seems to me, parking agencies in big cities will regulate and control all motor-vehicle terminal facilities in the interest of public convenience and necessity, because there are aspects of terminals which closely resemble those of public utilities; hence they may finally demand similar control.

Whatever the future may bring in progress, however, let us not fail to look the present situation in the face, recognizing that:

We have not foreseen or provided against the great increase of parking demand in urban centers.

Private enterprise has not kept pace with terminal needs.

We have to deal with relatively fixed patterns, often of narrow streets, which cannot cheaply be widened.

Land values are too high and the right sites frequently unavailable to private enterprise for parking terminals.

Private enterprise alone may not be able to find cheap enough money for off-street terminals, because of previous records of failures or low returns from ill-advised investments in terminals.

The Union Square Garage in San Francisco represents a realistic approach to a solution of the terminal parking problem, wherein the city made the site in Union Square available at a token rental of only $5,000 a year, and where the financing was done with private funds from enterprises benefited by the facility, together with funds from the Reconstruction Finance Corporation. In 25 years, however, when this money is all paid back out of garage earnings, the garage will be turned over to the City of San Francisco, becoming then a wholly owned municipal facility. A plan has been advanced in Detroit for the construction of off-street parking space under Washington Boulevard. But it is not necessary to go underground. These cases are cited simply as examples of forthright action to solve the parking problem.

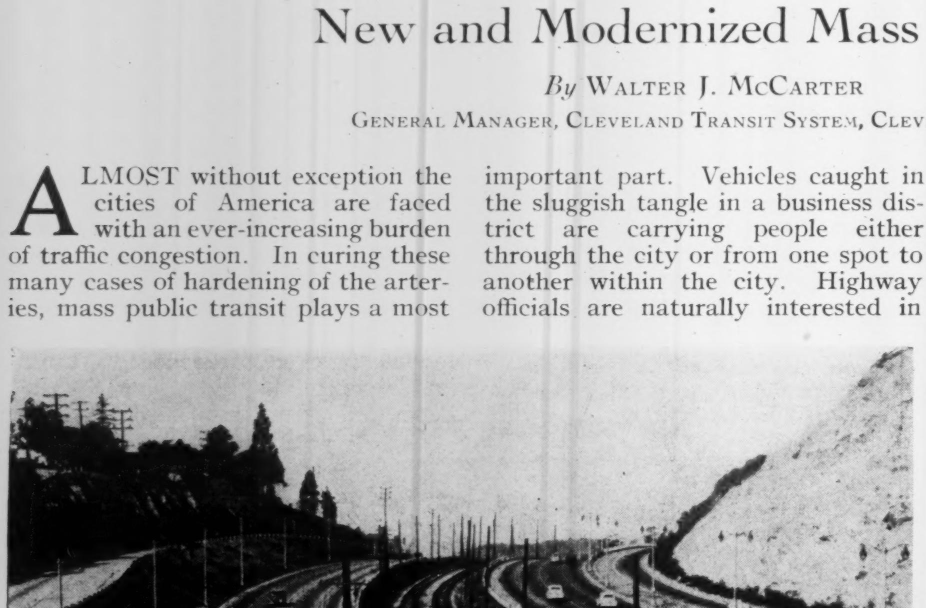
Almost everywhere there is need for a broader public understanding of the real functions performed in a municipal community by the right kind of parking terminals, in the right places, to obtain the most effective utilization of urban highway transportation in the community interest. The job of educating the public on the subject of parking terminals might well be the first assignment of a parking agency.

# New and Modernized Mass Transit

*By* Walter J. McCarter

General Manager, Cleveland Transit System, Cleveland, Ohio

Almost without exception the cities of America are faced with an ever-increasing burden of traffic congestion. In curing these many cases of hardening of the arteries, mass public transit plays a most important part. Vehicles caught in the sluggish tangle in a business district are carrying people either through the city or from one spot to another within the city. Highway officials are naturally interested in getting cars through the community. It is the second type of passengers, however, that are of greatest interest to public transit officials. It is by taking these passengers out of their cars and carrying them rapidly from origin to destination in mass transit vehicles that a great improvement in the movement of traffic can be effected.

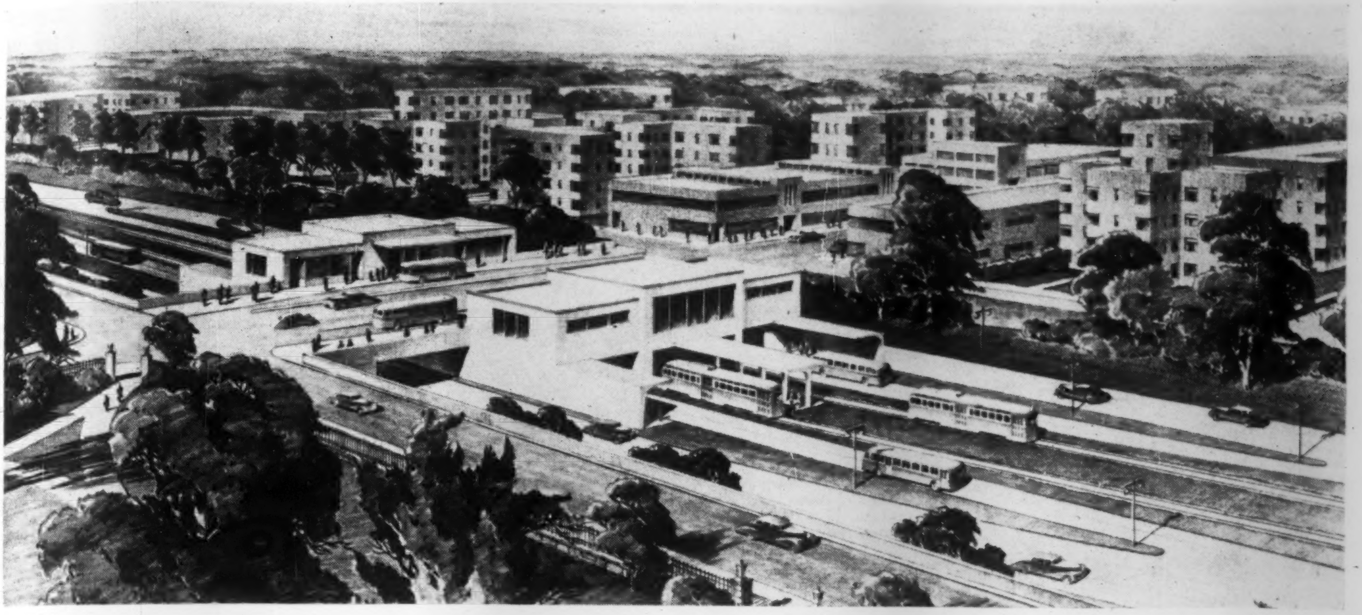


Combined Right of Ways for Rapid Transit and Freeway

People are just beginning to realize that public transit constitutes a definite part of this program. Ordinarily, in the good old days, the first thought of the planners was to get public transit vehicles off the streets so that the automobiles could get through. It is now realized that it is impossible to get all the automobiles required to carry the whole transport load through the streets, even without street cars in the way.

### RIDERS' LIKES

To find out what should be done it is essential to study the likes and habits of the people who cause the congestion. It is impossible to regulate where the private automobile will go. The driver is going to go where he wants to go if there is any way for him to get there. He may find traffic so congested that he will



Suggested Station for Combined Transportation Facilities at Intersection of Expressway and Major Street

stop going even where he would like to go, but a better solution would seem to be to provide a means for him to get there. If mass transit gives him what he wants, he will not persist in driving his own car.

In providing desirable mass transit facilities, emphasis has most often been put on cheapness. This is a mistake. People don't want a cheap ride; they want the best ride they can get and are willing to pay the cost.

An illustration to the point is the situation found to obtain at one point about five miles from downtown Cleveland. At that point people have a choice of two kinds of transportation. There is the old-fashioned street car (and I mean an old-fashioned street car) on which it is possible to ride into town from that point. The fare for this trip is ten cents cash, eight and a third cents by ticket, or about five cents a ride by weekly pass.

But an observer standing at that point any morning in the rush hour will see those cars go by with vacant seats. Then he will see a bus come along, the smallest bus owned by the transit system, the shortest wheel base, the most uncomfortable vehicle a person can ride in, and at that point it is so crowded that the people have to fight to get in the front door, to stand in the step well with somebody's elbow in their chin all the way downtown—and they pay 15 cents for that. As a matter of fact, so many people want to do that, even under these crowded conditions, that it is necessary to operate 42 buses, whereas on the same line, covering the same distance, only 15 street cars operate.

Why do people want that uncomfortable ride? Because they save time. How much time? How much time is it that people want to save? From that point, the bus gets downtown just eight minutes faster than the street car.

### TIME SAVING

That story has been told a good many times in Cleveland; it has been told right in the community where those people get on. In answer, people jump up and say, "I save half an hour," "I save twenty minutes." They save eight minutes' time. However, it is not only the actual saving in time; it is the psychological idea of saving time, because the vehicle makes fewer stops and it seems to the passengers that they are getting downtown a great deal faster.

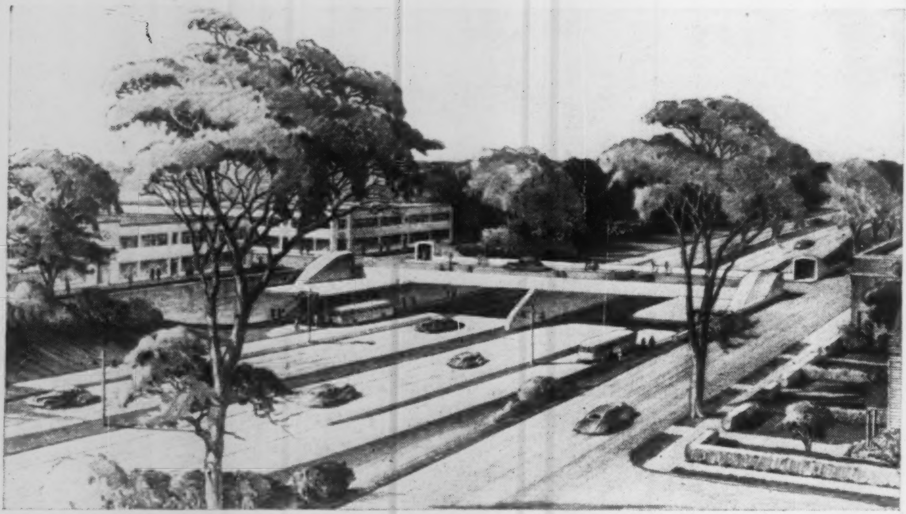
Speaking before these community groups in outlying sections of Cleveland I often ask, "What is it you want?" The most frequent answer is, "We want some of that fifteen-cent bus service." They don't say, "We want the fare reduced"; they say, "We want some of that fifteen-cent bus service," which means a higher quality of service. Therefore if a new and modern transit system is to be developed, one that is going to appeal to the automobile driver who is now congesting our streets, it must provide for him the kind of public transportation he wants and is willing to pay for.

Back in 1940, the State Highway Department of Ohio made a survey in Cleveland of all the people employed downtown and how they got to work. Since the information was on IBM cards, it was reshuffled and the people divided into two groups: those who lived within four miles of downtown, and those who lived farther out. It was then determined how each group got to work.

Of the people who lived within four miles of downtown and worked downtown in 1940, 71% used public transportation mediums and 29% drove automobiles. Of those who lived more than four miles from the downtown area, 46% used public transportation and 54% drove private automobiles. Therefore in Cleveland, who is it among the workers that are congesting the downtown streets, who are using private automobiles just to drive back and forth to work, making this rush-hour congestion? It is those people who live more than four miles from the downtown district.

Therefore, from a strict business standpoint, from the viewpoint of the transportation agency, we must improve the quality of mass transportation service for those people who live more than four miles from downtown. When this is done, the quality of the service in the inner zone naturally improves because the existing inner transportation is reserved exclusively for inner-zone users. If we can improve sufficiently, then we will begin to take off the street those people who don't need to drive downtown but who nevertheless create congestion.

What is being done to improve mass transit facilities? Cleveland's experience may provide an answer. Four types of transportation are being



SUGGESTED BUS LOADING PLATFORMS ON EXPRESSWAY

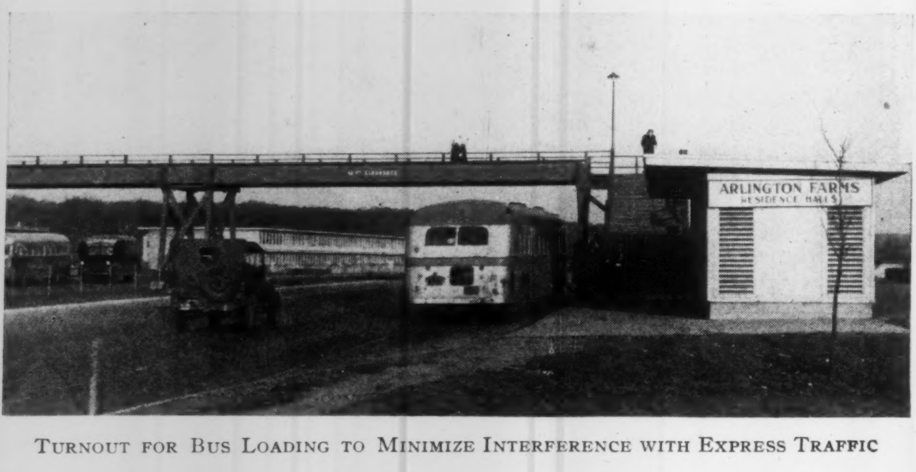
offered, depending on zones of distance from the downtown district. In the most remote zone, from eight to twelve miles out, express buses are operated—with a 15-cent fare. These pick up people in the outer zone, then make limited stops from the eight-mile radius into the center of town. If people want to use the lowest fare, they can transfer to basic service at the point where the bus becomes an express. On one of these lines, 42 buses are operated. The street-car line providing basic service over the same route uses only 15 street cars and most of the passengers on these get on within the inner four-mile zone.

In the next zone, from four miles to eight miles out, another type of service will soon operate. It is a limited-stop bus service at a fare but two cents above the basic fare. As in the outer zone, passengers can transfer to basic service at the zone limit at a slight saving in fare if they want to take the extra time required for the trip.

Within the four-mile zone, a trolley system operates at basic-fare rates. At the core of the four-mile zone, reduced-fare loop buses operate. These, however, operate only at certain hours to provide a special type of service that can be best explained by an illustration.

### LOOP SERVICE

Some years ago, a parking lot opened up at the corner of Euclid Avenue and 21st Street—less than a mile from the heart of town. That point was at the edge of what was then a three-cent zone on the trolley system. The lot was outside the congested central area, and there people could park their cars and complete the trip into town on the trolley for only three cents. When the three-cent zone was discontinued, the parking lot lost its business. When it was resumed, business in the lot rose again to about the 200-car volume experienced earlier. Then the five-cent loop buses were put in service. What happened? Almost immediately the parking in the lot increased to its capacity of 600 cars, and on many days overflowed this capacity.



TURNOUT FOR BUS LOADING TO MINIMIZE INTERFERENCE WITH EXPRESS TRAFFIC

This downtown loop bus line requires 16 buses and is strictly an off-peak service. The buses are the same ones that have operated on the express routes during peak periods. The service is therefore largely for shoppers and those whose hours of work are irregular. The service is profitable too. Revenue reaches 54 cents a mile, which for a 27-passenger bus is good business.

Now the City of Cleveland is considering a free municipal parking lot, a very large parking lot, down on the lake front near the Municipal Stadium. Again that parking lot is out of the business district. It is adjacent to the only freeways we now have in Cleveland, which are up and down the Lake shore and which come in at East 9th Street. At East 9th Street, on the business side of the Shore Drive, there is a bottleneck; there are good freeways but there is no way to get in and out except on a basic street, and that street is overloaded.

If drivers of these private automobiles can be persuaded to swing into this parking lot, and can use the loop bus service to bring them downtown, it will help correct the traffic bottleneck that has developed. Instead of the large number of cars that it takes to carry the 27 passengers one bus can carry, there will be just one vehicle passing through the congested area.

Public transportation has a real obligation in relieving downtown traffic by encouraging those who still insist on driving their automobiles to park them at the periphery of the downtown district and go the rest of the way on a public transportation medium. If this can be accomplished, then the traffic problem in the downtown district will have been largely solved. The only way to get riders on transit vehicles is to functionalize the service so that each individual gets the kind of service he wants.

A real rapid-transit system is being planned for Cleveland so that when the vehicles from outlying zones hit the four-mile zone they go to private right of way and never again come in conflict with other traffic. It is a combination of rental of right of way, development of right of way, and a downtown subway. The capital investment for such a program will be around $24,000,000.

The responsibility for financing such a program is a joint one. The transit interests and the city must both recognize their obligation to provide needed service and eliminate the costly, exasperating tangle of congested traffic in the downtown area.

# An Expanding Reclamation Program

*By* Kenneth Markwell, M. ASCE

Assistant Commissioner, Bureau of Reclamation, Washington, D.C.

The largest construction program in the 43-year history of the agency is being undertaken this year by the Bureau of Reclamation in harnessing Western rivers for irrigation, power production, flood control, and other purposes. The program involves construction on 28 major Reclamation projects designed to more fully develop the water resources of the West in meeting peacetime needs for agricultural and industrial expansion.

To finance this greatly expanded construction program, funds totaling approximately $160,000,000 have been made available to the Bureau for the fiscal year ending June 30, 1946. Of this total, $147,766,900 is allocated to the construction of dams, irrigation systems, power plants, transmission lines, and other engineering structures. Approximately $7,000,000 additional will be used in carrying forward the detailed economic and engineering investigations on projects under study and for payment of salaries and administrative expense.

Authorized projects on which the Bureau is resuming construction work interrupted by the war will cost more than a billion and a half dollars to complete. They include such well-known developments as the million-acre Columbia Basin Project, with its huge hydroelectric installation at Grand Coulee Dam in the state of Washington, the Central Valley Project in California, and initial projects included in the coordinated plan for development of the Missouri River Basin.

## PROJECTS LISTED

The people of the West are alive today as never before to the need for developing their water resources to the utmost. In many areas throughout the 17 Western States rainfall is insufficient to sustain normal crop production. The water in their rivers, therefore, is a basic natural resource, second in importance only to the land itself. The program of the Bureau is aimed at full development of that resource. Its multiple-purpose projects will harness these rivers to irrigate new land, develop low-cost power for industrial expansion, protect life and property against floods, furnish municipal water supplies, aid in the conservation of fish and wildlife, and develop recreational areas.

Listed in Table I are Bureau projects on which construction is scheduled for 1946, with the estimated total cost of each, the construction cost to June 30, 1945, and the estimated construction program for the 1946 fiscal year.

To continue work on these and other projects throughout the next fiscal year, July 1, 1946 to June 30, 1947, the President has recommended an appropriation of $163,554,000, which is now pending before Congress. If this amount is granted and the Bureau is able to continue construction at the rate contemplated in 1946 and 1947, it is estimated that an additional 6,500,000 acres of land could be benefited by irrigation from federal reclamation projects by 1950–1951. This is the equivalent of more than 72,000 farms, of which about 46,500 would be newly irrigated lands available for settlement or purchase by demobilized veterans and others. The remaining farms would be on land at present irrigated, on which water supplies are inadequate and which would receive a supplemental supply from Bureau-constructed projects.

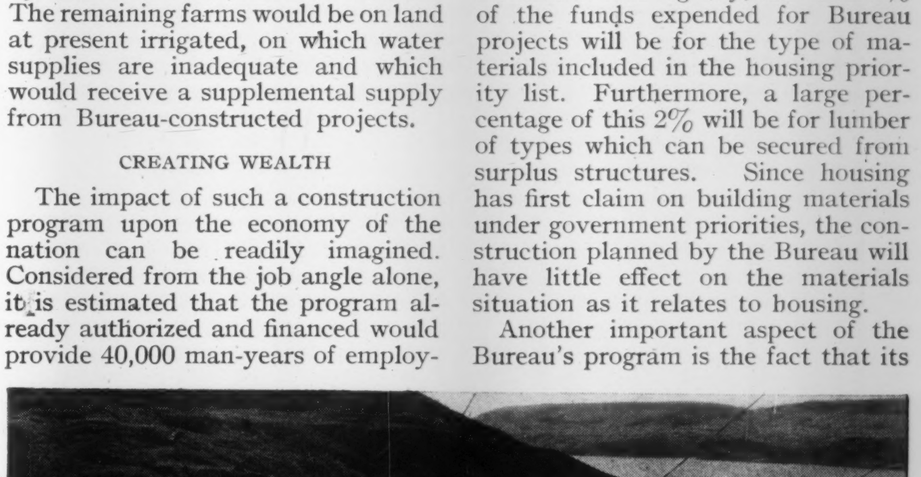
## CREATING WEALTH

The impact of such a construction program upon the economy of the nation can be readily imagined. Considered from the job angle alone, it is estimated that the program already authorized and financed would provide 40,000 man-years of employment in this fiscal year of 1946, and 143,500 man-years of work for the 1947 fiscal-year program. This includes employment created both at construction sites and in off-site factories, mills, and other supply centers.

It should be understood, however, that the Bureau's program is not a "public works program" in the commonly accepted sense of that term. Its primary purpose is not to create temporary construction jobs but to create new and permanent wealth-producing assets through the orderly and economic development of natural resources that will be of permanent benefit not only to our own generation but to many generations to come.

Also, the construction program of the Bureau is of such a nature that it will not compete to any substantial degree for materials needed in the national housing program. According to careful studies made by the Federal Works Agency, less than 2% of the funds expended for Bureau projects will be for the type of materials included in the housing priority list. Furthermore, a large percentage of this 2% will be for lumber of types which can be secured from surplus structures. Since housing has first claim on building materials under government priorities, the construction planned by the Bureau will have little effect on the materials situation as it relates to housing.

Another important aspect of the Bureau's program is the fact that its



From the Reservoir Behind Grand Coulee Dam Will Come Water to Irrigate Millions of Acres

CONSTRUCTION OF THE 156-MILE FRIANT-KERN CANAL IS UNDER WAY
It Will Carry Water to San Joaquin Valley Farms

projects are largely self-liquidating. The major portion of the cost of building them is repaid to the federal government in cash by those directly benefited—namely, farmers whose land is irrigated, consumers of electric power, and municipalities provided with domestic and industrial water supplies. Before being authorized for construction by Congress, every Bureau project must pass the test not only as to engineering feasibility but also as to economical soundness and ability to return the bulk of its construction cost over a 40- to 60-year period.

At the present time, the federal government has an investment of almost one billion dollars in Reclamation projects. The Bureau of Reclamation, created by Act of Congress in 1902 as an agency of the Department of the Interior, now has operating projects which provide water for irrigating more than four million acres. It is also the world's largest producer of electric power. The hydroelectric plants operated by the Bureau reached a wartime peak output of almost 14 billion kwhr in 1945.

In resuming its normal peacetime construction program, the Bureau is scheduling work on a wide variety of engineering structures. On the Columbia Basin Project, for example, several hundred miles of irrigation canals are to be built; work will be continued on the power plant preparatory to installation of three additional 108,000-kw generators; and work will be continued on the irrigation pumping plant, which is to house the largest water pumps ever built. Work has been in progress since September on the 156-mile Friant Kern Canal on the Central Valley Project in California and is scheduled to begin soon on the 120-mile Delta-Mendota Canal and other features of the irrigation system to provide a full or supplemental water supply for more than two million acres of highly productive land in the San Joaquin and Sacramento valleys.

The Bureau is also starting work in 1946 on the construction of three initial units out of 29 authorized under the coordinated plan for broad-scale development of Missouri Basin resources. These are the Kortes Dam and power plant on the North Platte River in Wyoming, on which a $4,688,000 contract has been authorized for award; an earth-fill dam on the Cheyenne River to impound water for irrigating 16,000 acres on the Angostura Project in South Dakota; and the Boysen Dam and power plant on the Big Horn River in central Wyoming. Investigations are being completed on eight other Missouri Basin projects. Funds have been provided to start construction of approximately 320 miles of transmission lines to bring power from Fort Peck Dam for use of the Corps of Engineers in the construction of Garrison Dam on the main stream of the Missouri above Bismarck, N.D.

Notice to proceed has been issued for work on a $21,462,505 contract for construction of Davis Dam on the Colorado River, about 65 miles below Boulder Dam. The concrete lining of the 13-mile Alva B. Adams Tunnel under the Continental Divide has been completed, and work will continue on other features of the Colo-

TABLE I. BUREAU OF RECLAMATION'S 1946 CONSTRUCTION PROGRAM

| APPROPRIATION TITLE | ESTIMATED TOTAL COST (at 1945 prices) | CONSTRUCTION COST TO June 30, 1945 | 1946 PROGRAM (Regular and Supplemental) |
|---|---|---|---|
| Reclamation Fund, Special Fund—Construction: | | | |
| Projects: | | | |
| San Luis Project, Colorado | $ 28,451,800 | $ 230,900 | $ 1,479,100 |
| Boise Project, Idaho, Payette | 11,520,347 | 5,242,734 | 3,494,954 |
| Boise Project, Idaho, Anderson Ranch | 25,965,000 | 10,669,240 | 6,699,490 |
| Minidoka Project, Idaho | 34,486,901 | 23,069,327 | 725,200 |
| Palisades Project, Idaho | 29,746,000 | 36,900 | 1,663,100 |
| Sun River Project, Montana | 9,500,000 | 9,197,650 | 167,833 |
| Rio Grande Project, New Mexico | 12,062,845 | 9,956,645 | 1,274,400 |
| Tucumcari Project, New Mexico | 13,600,000 | 7,294,200 | 4,568,216 |
| Lugert-Altus Project, Oklahoma | 11,902,780 | 5,541,985 | 3,538,511 |
| Deschutes Project, Oregon | 9,900,000 | 4,698,728 | 3,484,435 |
| Klamath Project, Oregon | 10,531,605 | 7,614,210 | 1,695,341 |
| Ogden River Project, Utah | 4,483,902 | 4,380,951 | ....... |
| Provo River Project, Utah | 19,727,661 | 10,025,540 | 2,860,000 |
| Yakima Project, Washington, Roza | 19,662,500 | 14,752,988 | 2,312,412 |
| Kendrick Project, Wyoming | 20,945,000 | 18,227,568 | 822,432 |
| Riverton Project, Wyoming | 11,658,000 | 6,313,150 | 1,824,300 |
| Shoshone Project, Wyoming, Heart Mountain | 7,580,000 | 4,401,912 | 1,383,764 |
| Shoshone Project, Wyoming, Power and Willwood divisions | 5,621,951 | 4,168,823 | 1,260,233 |
| Total projects—Reclamation Fund | 287,346,292 | 145,823,451 | 39,253,721 |
| General Fund—Construction: | | | |
| Projects: | | | |
| Gila Project, Arizona | 44,179,100 | 7,708,200 | 2,607,000 |
| Davis Dam Project, Arizona | 76,661,900 | 4,254,703 | 9,644,772 |
| Central Valley Project, California | 384,314,000 | 159,068,550 | 37,603,730 |
| Kings River Project, California | 71,581,000 | ....... | ....... |
| Colorado-Big Thompson Project, Colorado | 96,321,370 | 21,490,363 | 8,803,160 |
| Hungry Horse Project, Montana | 48,319,000 | ....... | 1,700,000 |
| Columbia Basin Project, Washington | 582,839,000 | 179,880,000 | 16,749,000 |
| Total projects—General Fund | 1,304,215,370 | 372,401,816 | 77,107,662 |
| Colorado River Dam Fund: | | | |
| Projects: | | | |
| All-American Canal | 70,161,000 | 30,446,300 | 6,861,662 |
| Boulder Canyon | 152,000,000 | 135,937,150 | 4,047,600 |
| Water conservation and utilization projects | 19,199,340 | 7,102,261 | 9,097,079 |
| Fort Peck Project, Montana | 6,670,554 | 659,031 | 1,199,911 |
| Missouri River Basin Project | 577,556,776 | 1,002,100 | 10,199,300 |
| Total, all projects, all funds | 2,417,149,332 | 693,372,109 | 147 766,935 |

Work on Anderson Ranch Dam Is About 70% Complete

rado-Big Thompson Project in Colorado. Construction is about half completed on Anderson Ranch Dam on the South Fork of the Boise River in Idaho, which will be the highest earthfill dam in the world; and construction progress is being made toward completion of the 145-mile Coachella Canal, a branch of the All-American Canal in Southern California.

Many other projects could be mentioned to indicate the variety and scope of the Bureau's 1946 program. While major emphasis will be on construction, another important aspect of its activities will be the continuation of engineering and economic studies on a great many other projects which have possibilities for development in the future. Some of these have already been authorized for construction. Also, by the end of the calendar year, the Bureau hopes to have completed the comprehensive reports on integrated programs for coordinated development of 15 major river basins in the West.

Full development of water resources is essential to the continued expansion of agriculture and industry in the West. Development of multiple-purpose projects to conserve and control our Western rivers yields benefits far-flung and long-lasting.

These projects open new lands for farm settlement and provide for increased production of non-surplus-type crops which are needed to sustain a growing population. They provide thousands of jobs for workers at construction sites and at supply centers many miles away. New towns will be created and existing towns will expand, increasing opportunities for business and professional men, trade and service people. New markets will be opened for products of other sections of the country. The availability of low-cost power will encourage the establishment of new industry and stimulate development of minerals, timber, and other natural resources.

Thus, the work of engineers in harnessing our rivers increases national wealth by millions of dollars annually, promotes economic security, broadens the tax base, stabilizes and brings into greater balance the economy of the West and, in general, helps to provide a higher standard of living for the whole nation.

### OPPORTUNITIES FOR ENGINEERS

Officials of the Bureau readily concede that the job of carrying out a construction program of this magnitude will be no easy task. It will be influenced by many factors over which the Bureau has little or no control—the availability of materials, equipment and machinery; the acute shortage of housing for administrative and construction employees; and the need of the Bureau to increase its own staff tremendously.

We are in immediate need of qualified engineers and engineering aides. More than 1,200 such personnel will be required for the Chief Engineer's staff in Denver to handle the greatly increased load of preparing designs and specifications for hundreds of engineering structures scheduled to be built on the various projects. Particularly needed are civil, electrical, mechanical, hydraulic, architectural, and structural engineers. Those with design experience and ability to prepare specifications and estimates, rather than field or construction experience, are especially needed at this time.

Applicants for such positions will be judged on the basis of experience and training. Written examinations will not be required for temporary appointments pending establishment of Civil Service registers. Salaries for engineers range from $2,320 to $4,300 per year, and for engineering aides from $1,572 to $2,980 per year. All appointments are made subject to Civil Service regulations, and veterans will be given preference. Inquiries regarding employment should be sent to the Chief Personnel Officer, Bureau of Reclamation, Department of the Interior, Washington 25, D.C.

A great many additional employees are also needed in carrying on the expanded programs being undertaken by the regional offices of the Bureau. Positions are open for accountants, draftsmen, inspectors, timekeepers, surveymen, mechanics, bookkeepers, stenographers, and many other classifications. Persons interested in applying for such positions should direct their inquiries to the Regional Directors of the Bureau at Boise, Idaho; Sacramento, Calif.; Boulder City, Nev.; Salt Lake City, Utah; Amarillo, Tex.; Billings, Mont.; or Denver, Colo.

# Construction Procedures at Fontana

## *Part II of Symposium on Fontana Spillway*

*By* Oren Reed, M. ASCE

Construction Engineer, TVA, Fontana Dam N.C.

*Vacuum mats and absorptive form liner were both used on forms for Fontana spillway concrete. The resulting dense surface was required because of high velocities in the tunnels and outlet structures. Constructive suggestions for similar work conclude Mr. Reed's article, which he adapted from an address before the Tennessee Valley Section. This structure on the Little Tennessee River was completed on an unusually tight wartime schedule.*

One of the main factors in making an accelerated schedule possible at Fontana Dam was the use of diversion tunnels, which made it feasible to open up the entire construction area at the same time for excavation, foundation preparation, and concrete placing. One of the major considerations in the design and location of the diversion tunnels was their adaptability to other uses after the diversion period. As at Boulder Dam, the Fontana spillway was located so that a portion of the diversion tunnels could be utilized as spillway outlets.

### DRIVING OF DIVERSION TUNNELS

The two diversion tunnels, of 38-ft diameter, were driven through the east abutment of the dam at the elevation of the spillway outlet (Fig. 1). As soon as both bores were opened, excavation on the inclined shafts proceeded, with one diversion tunnel at a time out of service. When construction of the dam and its facilities permitted, the diversion tunnels were plugged and the concrete lining of the spillway tunnels was completed.

The rock through which the tunnels were driven was fairly sound throughout their entire length. Unweathered rock consists of massive, dense, hard quartzite with thin interbedded layers and partings of relatively hard black slate or phyllite. Near the center of the tunnels, a thick (50- to 100-ft) zone of slate was encountered. A small amount of timbering was required at the upstream portal of Tunnel No. 2. Over-breakage in the tunnels was not excessive.

In as far as possible, the four tunnel headings were worked simultaneously, one crew and set of equipment being provided for the upstream headings, and a similar organization for the downstream headings. Drilling and loading were carried on in one tunnel while mucking was being done in the other. The 38-ft-diameter bore of each circular tunnel was excavated by the full-face method, leaving an invert section of about 5 ft in maximum height to serve as a roadway for the hauling equipment. Drilling of the tunnel face was done from a truck-mounted jumbo.

### BLASTING AND MUCKING

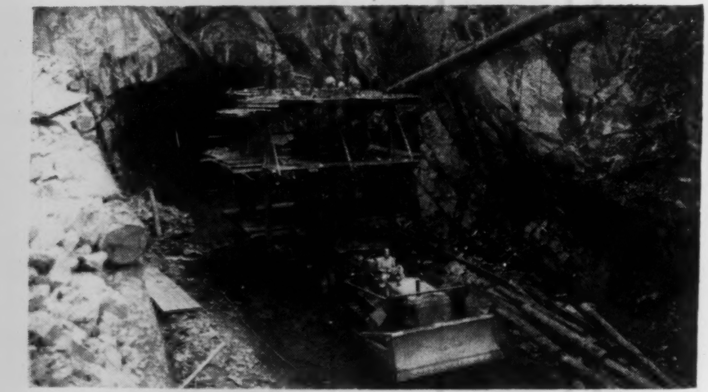
The 106 holes of the pattern were loaded and fired with delays. Each round pulled about 14 ft. Muck was loaded into diesel-powered trucks by a $1^{1}/_{2}$-cu yd Northwest shovel, which had been adapted for tunnel work by fitting it with a short boom. The invert segment was removed after the tunnels had been holed through, drilling being done by jackhammers. Tunnel muck was used to build the upstream and downstream cofferdams. The west tunnel, or Tunnel No. 1, was holed through on June 24, and Tunnel No. 2 on August 16, 1942, about three months after driving started. The cofferdams were completed so that the river could be diverted on September 7.

The upstream cofferdam was built to about El. 1335, which was approximately the elevation of the railroad tunnel under the right abutment of the dam. The diversion tunnels were expected to carry more than 50,000 cu ft per sec before the cofferdam would be overtopped. Actually the cofferdam was overtopped and flooded on December 29, 1942, because of heavy rains. The maximum discharge of the river at that time was estimated to be 48,000 cu ft per sec, and could have been carried by the tunnels without damage if the inlet structures had not been clogged by debris—largely logs and brush from the reservoir clearing operations. The damage caused by the flood was nominal but the delay that resulted from it was serious because the cofferdams had to be rebuilt and much silt and gravel had to be removed from the area. The runoff from other floods was carried through the diversion tunnels without special incident.

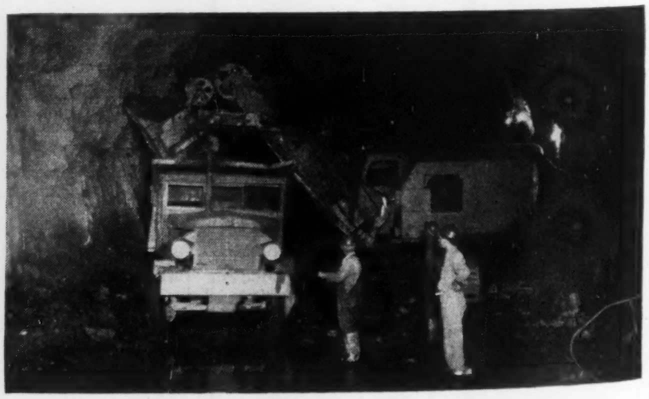
The downstream portion of each diversion tunnel was lined with concrete to give a 34-ft circular section to serve as a spillway outlet. Each tunnel was taken out of service in turn by placing stoplogs in the inlet structure when flow conditions permitted. The tunnel invert was cleaned up and placing of the concrete lining was started in August 1943.

### INVERT CONCRETE

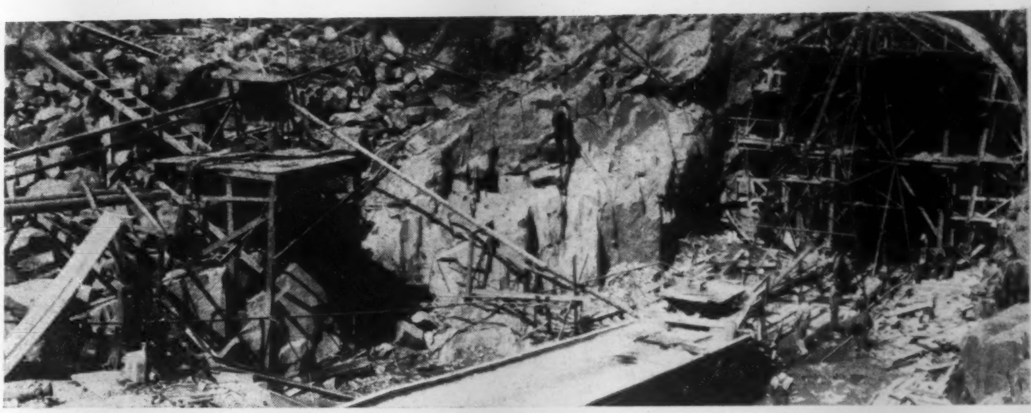
In the concreting program the first step was the construction of continuous concrete shelves to serve as rail bases for the invert screed. The



Truck-Mounted Jumbo Drilled 38-Ft Diameter of Face



Short-Boom Shovel Was Used to Muck the Headings



CONCRETE EQUIPMENT AND STEEL FORM FOR ARCH ASSEMBLED AT PORTAL

curved steel screed was supported by a steel framework, which could be pulled along the track by a Tugger hoist. Concrete was hauled by agitator trucks to the forms, where it was charged into a Pumpcrete machine, which conveyed it through an 8-in. pipe to the forms. The concrete was puddled into place and screeded off to the required concave surface. It was then smoothed down by floating and brought to a more exact grade. Vacuum mats having the proper curvature were then applied to the surface to extract the free water. A vacuum of approximately 25 in. was used for 15 to 20 minutes. Upon removal of the mats, the concrete was stiff enough to support the weight of a man, as all the free water had been removed and it was ready for the final steel trowel finish.

It was not possible to pull the screed along on the invert at a uniform speed and make an entirely smooth surface. Instead the resulting surface was wavy. There was a tendency for high points to be left at the beginning and end of each 29-ft section.

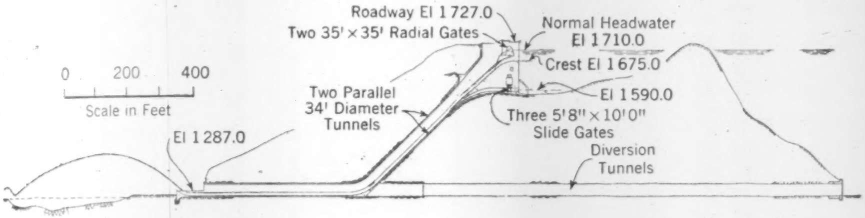

Roadway El 1727.0
Two 35' × 35' Radial Gates
Normal Headwater El 1710.0
Crest El 1675.0
0 200 400
Scale in Feet
Two Parallel 34' Diameter Tunnels
El 1590.0
Three 5'8" × 10'0" Slide Gates
El 1287.0
Diversion Tunnels

FIG. 1. SECTION THROUGH FONTANA SPILLWAY TUNNELS

### STEEL FORMS FOR ARCH CONCRETE

Two 30-ft sections of steel forms had been purchased for the placing of the arch concrete. After they were used to place the arch concrete at the upstream portals of the diversion tunnels, they were dismantled and shipped to another project, where they were used by a contractor to line a diversion tunnel. When returned to Fontana, these forms were again assembled without regard to the sequence of the 5-ft panels, which were theoretically interchangeable. Tight spots of rock had been shot off against the form to obtain proper clearance. The panels had not been matchmarked so that it was necessary to juggle the panels around to obtain the best alinement and fit. The assembly of the 30-ft section was very stiff and rigid and a major repair and adjusting job was necessary to make the forms ready for placing concrete. Even then the fit between the sections of the completed arch was far from perfect.

The use of the invert for trucking in concrete and materials for subsequent lining work necessitated the placing of about 2 ft of sand to protect the concrete. Concrete for the arch section was shot into place by a Pressweld pneumatic gun. Considerable experimentation on concrete mixes and methods of placing was done to decrease or eliminate the formation, along the lower part of the arch form, of air bubbles, which caused a rough surface for a height of 5 or 6 ft above the invert. This condition was improved somewhat by changing the proportions of the mix. Low-pressure grouting was performed in the arch section of the tunnels to fill the voids between the lining and the rock.

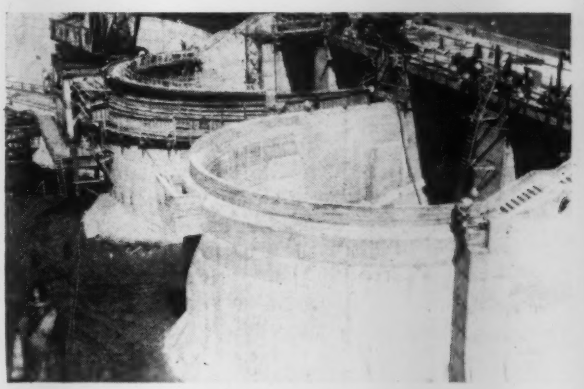
Where the inclined spillway tunnels join the diversion tunnels, concrete plugs, 164 ft in length, were constructed. The plugs are approximately 37 ft in diameter and are provided with tapered shoulders for anchorage. Tunnel No. 2 was taken out of service in September 1944 for the placing of the plug, while the plug was placed in Tunnel No. 1 immediately after the final closure on November 7, 1944. In general, concrete was poured in 5-ft lifts, and cooling pipes were placed on top of each lift in a manner similar to that used in the dam. The plugs were cooled and grouted to effect a tight seal in the tunnels.

### INCLINED SHAFTS

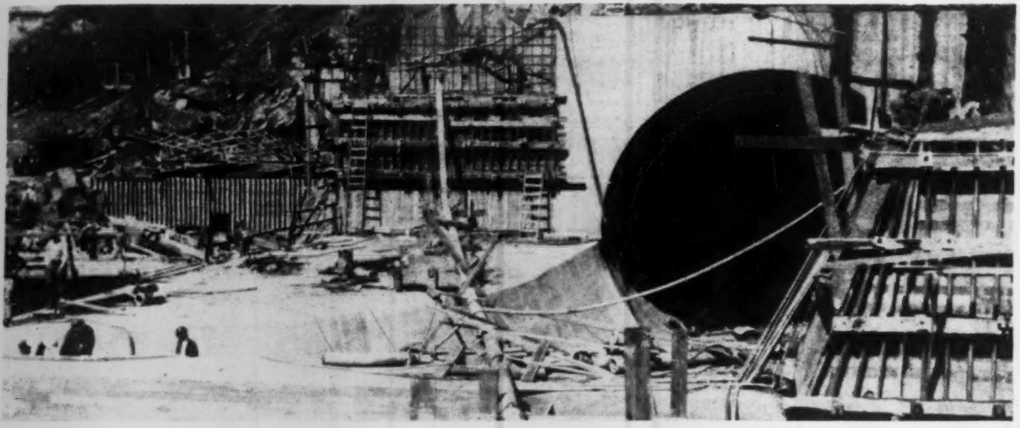
Excavation of the inclined shafts, which connect the open spillway at the top of the dam with the horizontal outlet tunnels, was started as soon as the diversion tunnels were in service. These shafts are the same size as the diversion tunnels for a slope distance of 227 ft from the bottom and then gradually change in a distance of 175 ft from a circular section to a horseshoe section 54 ft in diameter. There is a further enlargement through the barrel section, at the top.

During the excavating operations on the shafts, normal stream flow was passed through one diversion tunnel, while work was in progress in the other. Pilot shafts were used to expedite the excavation work. These shafts were driven from the bottom along the center of each inclined tunnel. Each shaft was 6 ft high by 12 ft wide and was timbered on one side to provide a muck chute. Muck fell from the chute into a hopper from which it was hauled by truck. The shafts were enlarged to full size as soon as the pilot tunnels were completed. Drilling was done from the top, using jackhammers. Muck was allowed to drop down the pilot tunnels and pile up at the bottom. It was removed at intervals by a small shovel and trucks. If the pilot tunnels had been located at or near the floor of the shafts, mucking time would have been materially reduced. However, this location would have required special care in the alinement of the pilot tunnels.

Concrete shelves were not used along the invert of the inclined shaft. The side invert form was carefully



SPILLWAY RISER BARRELS WERE POURED IN STEEL TRAVELER FORMS



Outlet Structure for Spillway Tunnel

alined and leveled and made strong enough to carry the Blaw-Knox steel invert form. Absorptive form lining was used on the invert. Invert and arch sections in the shafts were made 19 ft long. Concrete for the inclined shafts was supplied from a high-level trestle, thence lowered to the form in a carriage hopper, and chuted or shot into place. The arch forms were lined with absorptive form liner for a distance of 8 ft above the invert. Above the normal 34-ft-diameter section of the shaft, wooden panels, supported by the steel form, were used to form the expanding section of each shaft.

Air bubbles along the face of the forms were practically eliminated in the shafts by the use of the absorptive form liner. Except for a slight deviation at construction joints between invert sections, both the invert and the arch concrete of the shaft were in good alinement. Grouting was also done along the arches of the inclined shafts.

### JOB-FABRICATED FORM TRAVELER

Elevation of good rock had been accurately determined by core drilling, and the surface near the spillway was roughed out with a shovel to the indicated level. Widening of the shafts for the entrance barrel was then done without difficulty. A heavy steel traveler was fabricated on the job to carry wooden panels for the inclined portion of the barrels. Wooden-panel cantilever forms were used for the vertical walls of the barrels. Concrete was placed by the crane on the spillway trestle. The concrete of the barrels was held to good alinement and presents a very good appearance.

The elbow between the inclined shaft and the horizontal tunnel was designed to be built on a radius of 100 ft. Screeds for the two lower sections of invert were carefully set and braced. Concrete was pumped into the form, screeded off, and treated by the vacuum process before the final troweling. Next the upper two sections of invert were formed, using curved wooden panels, which were lined with absorptive liner material and supported by the steel invert forms. The arch was formed by means of wooden panels supported on the Blaw-Knox traveler. Absorptive form liners were used on the arch form for a height of about 8 ft above the invert.

The last items of the spillway to be constructed were the concrete outlet structures, or buckets. Final cleanup at the outlets of the tunnels required considerable hand labor, particularly for the cutoff trenches at the ends and sides of the structures. While concrete was being placed in the cutoff trenches, a small invert section was poured. The remainder of the concrete was placed under and around a form, which was built on the carpenter-shop platform. These forms required very careful work, similar to that for a power-house draft-tube form.

Forms were carefully alined and braced. Vacuum mats were applied to the surface of these bucket forms, which made it possible to remove the free water near the surface to give a dense, hard concrete, which could withstand the high velocities and abrasive effect of the discharging stream. During the concreting operations, it was found necessary to supplement the vacuum pump by siphons, which were operated by high-pressure jets.

### TUNNEL ROUGHNESS CORRECTED

In the early spring of 1945 the tunnels were inspected to determine whether the lining would meet the roughness standards established by tests of cavitation in the Authority's Hydraulic Laboratory. Results showed that considerable corrective treatment was necessary, especially for the horizontal sections. In a few places it was necessary to chip out defective concrete. This was removed carefully, leaving clean edges and dovetailed recesses. Concrete was carefully tamped back in the recesses, using a very dry mix. Deep cuts in the surface, caused by air tools or tractor track scars, were treated in a similar manner. High and wavy areas were bushhammered and ground down to equal or better the required criterion of roughness. The corrective treatment was done very carefully on the invert and was carried up a short distance above the springing line of the tunnel.

It was necessary to provide good protection for the slopes of the tailrace channel because of the high velocities and waves that will occur when the spillway is discharging. A concrete toe wall was built at the bottom of the heavy rock riprap. On the right bank, which will be in the direct line of flow from the tunnels, a large proportion of heavy rock was used, individual pieces weighing as much as 8 to 12 tons. Smaller rock was used between the large pieces. Outside the area directly in front of the spillway tunnels, the larger stones varied from 2 to 5 tons in weight.

### LESSONS LEARNED

From experience during the construction of the main spillway tunnels, and from observations made during and after the performance test on June 16, 1945, the writer has drawn the following conclusions:

1. Design of the Fontana spillway structures, although appearing to be very involved at certain points, particularly at the upper barrels and outlet structures, did not present insurmountable construction difficulties.

2. The screed, which was used for the horizontal invert sections, should have been heavier and more care should have been observed in its use.

3. It is necessary to use a heavy arch form (as was used at Fontana) but special care must be taken to keep the sections in proper condition and alinement. The pieces of the traveler should be matchmarked when it is first assembled so that a good fit can be obtained at subsequent reassemblies.

4. Absorptive form liner should be used on the lower portion of a steel arch form to prevent the formation of air bubbles.

5. Construction of the elbow and plug should always be separate operations. When a plug is being placed, the primary objective is to get it in place as quickly as possible, while extreme accuracy of alinement and grade is of special importance for the elbow.

6. The hard, dense, concrete surface produced by the vacuum treatment is important for durability, but it is probable that good untreated concrete would be satisfactory to withstand the high velocities of the discharging stream if special care were paid to grades and alinement.

# Professional Engineers in Southern California Form Bargaining Units

*By* Sterling S. Green, M. ASCE

Chairman, Committee on Employment Conditions, Southern California Professional Engineering Association

The history of the Southern California Professional Engineering Association, a collective bargaining group, dates back to a meeting held in November 1943. At that time a group of engineers assembled to discuss the report of the ASCE Committee on Employment Conditions, which had been approved by the Board of Direction at Atlanta, Ga., on October 11, 1943. This report recognized the danger that professional engineering employees would be included in heterogeneous bargaining units composed largely of subprofessional and non-professional persons. A remedy was suggested in the report. It recommended that Local Sections of the Society amend their constitutions to permit their members to establish Committees on Employment Conditions. (See Civil Engineering, November 1943, page 552).

Shortly thereafter the Board of Directors of the Los Angeles Section drew up an amendment of the Section Constitution in conformity with the action of the Board of Direction, ASCE, and submitted the amendment to the membership of the Section for approval by letter ballot. The amendment was carried by a 95% majority. After appointment of the members of the new Committee on Employment Conditions, notices were mailed telling of the formation of the Committee and carrying application blanks for membership in an association to be organized. About 100 members of the Section and 50 nonmembers returned the blanks requesting membership.

An organization meeting of the Southern California Professional Engineering Association was held on March 3, 1944. At this meeting various matters were discussed, among them the aims and activities of the group, and permanent officers were nominated. On March 28, 1944, the ballots for the permanent officers were counted and three officers were elected—Cato G. Cahill, Sterling S. Green, and William Simpson. By agreement, Mr. Green became chairman, Mr. Simpson vice-chairman, and Mr. Cahill secretary-treasurer. During the remainder of 1944, the officers of the Association spent a great many hours in preparing a set of "Rules and Regulations," revised membership application forms, and a prospectus; and in deciding matters of policy and procedure for the group.

### UNITS ORGANIZED

A number of members of the Association, employed at the Southern California Gas Company and at the Douglas Aircraft Company, Santa Monica plant, organized "units" for the purpose of bargaining with their employers on matters of salaries and working conditions. A request of the Southern California Professional Engineering Association directed to the management of the Southern California Gas Company to discuss salaries, hours, and working conditions of their professional engineering employees was refused. As a result, on March 27, 1945, the Chairman of the Committee on Employment Conditions of the Association filed a "Petition for Certification of Representatives" with the Regional Director of the 21st Region of the National Labor Relations Board in Los Angeles, Calif.

*Determination of the job classifications to be included in a bargaining unit was discussed at great length in the negotiations between the Southern California Professional Engineering Association and the Southern California Gas Company. A detailed account of significant considerations brought out in these hearings was the subject of an article by Col. William N. Carey in the March issue (page 130), entitled "Collective Bargaining by Engineers in Los Angeles, Calif."*

The Regional Director assigned the case to a Field Examiner and scheduled a conference for April 10, 1945, between the representatives of the Gas Company and the Southern California Professional Engineering Association, and with the Utility Workers Organizing Committee (CIO) represented. At that meeting the CIO asserted an interest in the technical employees of the Company.

An attempt was made to define the scope of a unit and this was found to be impossible on the basis of the available information in regard to the supervisory and professional character of the work of the technical employees. The Company agreed to furnish additional information in regard to the exact amount of responsibility of the various engineering employees.

### SCOPE OF UNIT DISPUTED

No objection was raised against the principle that confidential employees to whom "personnel supervision" had been delegated were ineligible for membership in a collective bargaining unit, but the Southern California Professional Engineering Association differed with the Company in the specific application of the principles to individual cases. The Southern California Professional Engineering Association also differed sharply with the Utility Workers Organizing Committee (CIO) with respect to the classifications to be included in the unit, the position of the Southern California Professional Engineering Association being that the classifications included should be only those in which the personnel performed work of a professional level, as set forth in the definition of a professional engineering employee adopted by the Board of Direction of the Society on October 11, 1943.

It soon became apparent that a dispute affecting commerce existed between the Company and the two organizations and that the Regional Office had exhausted its resources in attempting to settle the dispute. Consequently, the Regional Director assigned a Trial Examiner to conduct a formal hearing to develop the evidence required for the National Labor Relations Board to make a decision as to the appropriate unit for collective bargaining and if possible to determine the bargaining agent.

The first brief hearing convinced the Association that legal counsel was highly desirable in the maneuverings for position. Therefore, before the hearing was reconvened, an attorney was retained to represent the Association. Engineering employees normally are unfamiliar with the rules of procedure in pleading cases before a court, and although this fact is taken into account by the Trial Examiner, there is no doubt that the proceedings are delayed by the inexperience of the amateur in making up his mind as to what to do in regard to motions, objections, stipulations, and the order of introduction of testimony. A complete faith in the justice of one's cause is not an adequate defense against the legal devices of an experienced labor union lawyer.

### COMMUNITY OF INTEREST

During the course of the formal hearing, the Utility Workers Union directed its efforts to proving that the various laboratory classifications worked under similar conditions, as did the various employees in the design engineering department, and that the appropriate unit must be one in which all the employees working side by side would be included. This stand of course neglects the contention of the Association that the community of interest is based upon the degree of professional responsibility that the individual has, and not upon his working in close proximity to another group of employees. The position of the Company was that it could not favor one organization over another but that from an administrative standpoint it preferred to deal with only one rather than with a number of unions representing its employees. Also, the Company successfully contended that many of its engineers were confidential employees in that they had access to records that had a direct bearing upon whether the Company could or could not make a profit.

On January 17, 1946, the National Labor Relations Board handed down a "Decision and Direction of Election" setting forth the scope of the appropriate unit and ordering that an election be held to determine the exclusive bargaining agent for the unit, the election to be held within thirty days from the date of the decision. The appropriate unit contained a scant majority of professional engineering employees in the classifications requested by the Association but barring 31 individuals on the basis of personnel supervision, that is, substantial authority with respect to hiring, firing, or preparing personnel ratings for other members of the unit. The unit also included a total of 85 draftsmen and laboratory assistants, some of whom were eligible for membership in the Association on the basis of personal qualifications but whose work was generally subprofessional as regards responsibility.

Apparently, the usual organizing methods of unions are not effective on professional and technical employees, as the Association was selected over the Utility Workers Union by a margin of 105 to 38. Thirteen employees voted against any collective bargaining agent, a surprisingly small number in a total of 171 eligible to vote.

In the period since the election notices were posted the agreement between the Company and the Association has been approved. This agreement, a 57-page printed document, covers scope, recognition, salary policy, payroll classifications, employment and discharge conditions, seniority, working hours, overtime, holidays, vacation and sickness allowances, safety, termination wages, grievances procedure and arbitration, no strike or lock-out, and effective date and term.

### DOUGLAS AIRCRAFT CASES

At the Douglas Aircraft Company a quite different situation prevailed in regard to the formation of a unit. Most of the Association members at the Douglas Santa Monica plant were employed in the Strength and Weight Section, with only a scattering of members in the other engineering groups. On April 4, 1945, a letter was addressed to the Douglas Aircraft Company requesting a conference to discuss the representation of professional engineers at the Santa Monica plant. On April 9, the Company replied, stating that the proposed unit was inappropriate and suggesting that the Association institute proceedings before the National Labor Relations Board. Accordingly, a petition for certification of representative for a unit was filed on April 17, 1945.

On June 5 the Association and the Company signed an agreement for a consent election to determine whether or not the employees wished to be represented by the Association. The election was held on June 15, 1945, among the 330 eligible employees. They voted 203 to 83 in favor of representation by the Association.

As soon as the results of the election were received, similar proceedings were begun at the El Segundo plant of the Douglas Aircraft Company. These negotiations resulted in an election on August 31, at which 233 were eligible to vote, and at which the Association was selected as representative by a vote of 153 to 19.

The Association requested, on November 20, 1945, a series of conferences with the Company, and the Company agreed to start them on December 4, with representatives from the El Segundo unit. At the first meeting it was decided to include the Santa Monica unit in the remaining discussions. To avoid waste of time, the Association's proposals were sent to the Company on December 12 for study by the Company, with a request for comments and counter proposals. On account of the press of business caused by negotiations of contracts with other labor organizations, the Company was unable to proceed with the conferences until February 8, 1946, at which time a series of discussions began which settled the matters of contract provisions and salary adjustments. The actual signing of the contract was postponed until March 21, as the Company was unwilling to sign any contracts until an agreement with the International Association of Machinists (AFL) was completed.

Early in 1945, a group of professional engineering employees at the Los Angeles Department of Water and Power met together to discuss organizing a unit of the Southern California Professional Engineering Association in the Department. The consistent stand of the Board of Water and Power Commissioners has been that it will not recognize any organization as the exclusive bargaining agent for groups of its employees but that it will consult with the representatives of such groups in matters of employee relations. Accordingly on March 7, 1945, eighteen members of the Association met, approved a constitution, and elected officers for a one-year term. The management of the Department was notified that the Association represented the professional classifications of engineering employees and that arrangements had been made for the Association to be represented at the various discussions of rules covering the working conditions of employees.

### PACIFIC ELECTRIC RAILWAY

In November 1945, the International Federation of Technical Engineers, Architects and Draftsmen Union (AFL) started organizing the engineering employees of the Pacific Electric Railway Company in Los Angeles. Several of the professional engineering employees, fearing that they would be included in the unit if one were organized, made inquiries as to the possibility of organizing a unit of the Southern California Professional Engineering Association. Assistance was given to these engineering employees by the Association, and in a very short time a majority of the professional employees in the Company's employment had become members of the Association and asked for recognition of their organization as the bargaining representative of all the professional engineering employees of the Company.

Upon notification, the IFTEA and DU declared an interest in representing this group and they were given thirty days by the management to develop their case. At the end of this period no substantial interest could be proved so their case was closed by the Company. In view of this expression of interest, however, the Company declined to recognize the Association as the bargaining agent. The Association has applied to the National Mediation Board for the services of a mediator to help determine the scope of the appropriate bargaining unit and the bargaining representative under the provisions of the National Railway Labor Act.

In many respects the progress of the Association has been slow, as is often the case when men have to think in terms with which they are not familiar. Policies that were developed in terms of a defense against unionization had to be quickly recast in terms of a labor organization that was consistent with the philosophy of the National Labor Relations Act. An organization for defensive purposes alone has no standing before the National Labor Relations Board.

Ideas as to what constitutes an appropriate bargaining unit have had to be revised in terms of functions rather than in terms of educational or experience requirements or professional attitudes toward one's occupation. Not all of these perplexing problems have been solved satisfactorily but it has been demonstrated that engineers do have the ability to produce workable solutions to many of these problems when they set out in earnest to do so.

# Engineers' Notebook

*Suggestions and Practical Data Useful in the Solution of a Variety of Engineering Problems*

## Underpinning Interior Columns to Permit Tunnel Construction

*By* Albert G. DiGiacinto, Assoc. M. ASCE
Senior Engineer, Spencer, White and Prentis, Inc., New York, N.Y.

Underpinning the interior columns of a section of the Asbury Park Press Building made possible the construction of a service tunnel required to connect two existing basements. As indicated in Fig. 1, the basement of the pressroom was separated from the area to be utilized for storing newsprint by a section of the building 45 ft in length, with no cellar. Business offices, which were located on the ground floor, were moved to another section of the premises to permit construction of the tunnel. Occupancy of the second and third floors continued without interruption throughout the construction period.

The four interior columns, which were underpinned, carried approximately 40 tons each and rested on spread footings 4 ft by 4 ft in area, and 3 ft 6 in. below the floor. A test pit excavated in the building indicated that ground water would be encountered 9 ft below the floor and that the fine beach sand present at the site would stand up at a considerable slope. Character of the material made possible a simple underpinning consisting of concrete piers 3 ft 6 in. by 6 ft in plan, carried 10 ft below the floor level. The original spread footings loaded the soil to 2.5 tons per sq ft. Since the concrete placed for the underpinning weighed 10 tons, the new $3\frac{1}{2}$ by 6-ft pier, with an area of 21 sq ft, induced a load of 2.4 tons per sq ft on the soil.

Columns A and D (Fig 1) were underpinned simultaneously, after which the shoring was set up at the other two columns, B and C, so that they could be worked on at the same time. While the underpinning was being installed, two 18-in. needle beams 20 ft long supported the column through two jacks reacting against brackets welded to the sides of the columns. Ends of the two needle beams rested on timber mats. To prevent settlement of the columns when the load was transferred to the needle beams, load was applied by the hydraulic jacks until the columns were raised about $^1/_8$ in. In this process the needle beams were given the deflection necessary to carry the load, and the soil under the plank mats was stressed.

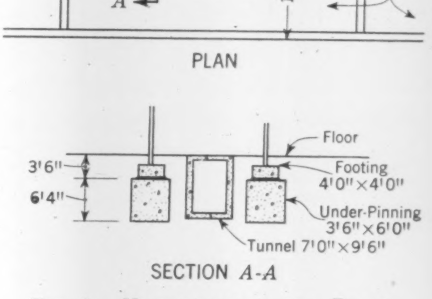


Fig. 1. Underpinning for Press Building

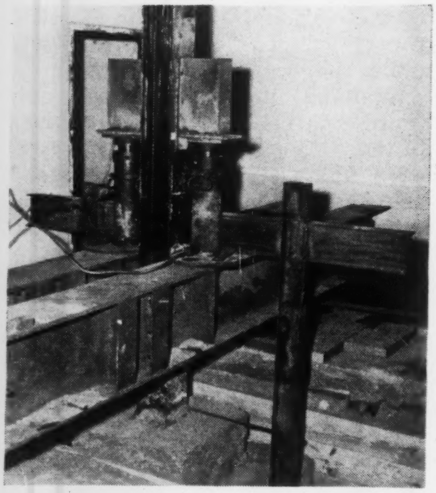
Movement of the columns was carefully checked by means of a level set up to observe marks made previously on the columns. As soon as the load had been picked up, the collars on the screw jacks were tightened so that the hydraulic pressure no longer was needed to maintain the loads. The jacks remained in place throughout the entire underpinning period. The columns were observed daily, and from time to time, when a slight settlement was observed, they were raised by means of the hydraulic jacks. The range of movement was $^1/_8$ in., and the work was done without damage to the structure supported by the columns.

After the column loads had been transferred to the needle beams, the task of digging pits for the underpinning went forward. Before any digging was done under the concrete footings, two brackets (fabricated by welding a cross member and heels to 6-in. I-beams) were installed to carry the existing concrete spread footing, for there were no anchor bolts in the footings. These brackets were supported by the same needle beams that carried the columns.

Steel wedges driven between the cross members of the brackets and the needle beams held the old concrete footing snuggly to the base plate of the columns.

The last foot of the pit had to be excavated below ground-water level and thus imposed a bit of a problem since the horizontal sheeting used is difficult to place in a water-bearing foundation without loss of ground. In this case the problem was solved by excavating a shallow sump in the center of the pit and removing the water with a 3-in. Mud Hog pump. The sand drained very nicely, permitting the remaining sheeting to be placed without loss of ground.

As soon as a pit had been excavated to grade, it was filled with 3,000-lb concrete to a point 2 in. below the old footings. After a lapse of about 24 hours, the space between the new concrete and the old footing was packed with a moist mixture of sand and cement. The dry mortar was rammed into the 2-in. space to make a very tight connection between the old and the new concrete. This dry-pack was allowed to set about 24 hours before the shoring system was removed and the load transmitted to the new underpinning pier.


COLUMNS AND FOOTINGS SUPPORTED ON NEEDLE BEAMS DURING UNDERPINNING

The underpinning was designed and installed by Spencer, White and Prentis, Inc., for whom the writer was in charge. Tom Day was superintendent for Ehret-Day, general contractors on the job. Joseph Weaver was general superintendent for the firm of Spencer, White and Prentis, Inc.

# Our Readers Say—

*In Comment on Papers, Society Affairs, and Related Professional Interests*

## Spiral Deflection Angles

TO THE EDITOR: Now that spiral curves are being used extensively, anything that tends to simplify the necessary calculations is very desirable. Ordinarily, calculating spiral deflection angles involves considerable mathematical manipulation, especially if odd chord lengths are required. Tables of deflection angles have been prepared for divisions of the length of the spiral into 10 and 20 chords and are published in a great many handbooks. The use of these tables facilitates the laying out of spiral curves where the conditions fit. But when it is desirable to locate points not in agreement with the even divisions of 10 or 20, then the necessary calculations require considerable work and are somewhat involved.

The slide-rule method is very simple and fast, and practically eliminates the chance of error. The application of this method is as follows: To find the deflection angle required, set the indicator on the total spiral deflection angle, in minutes, on Scale A of the slide rule, and opposite this set the length of the spiral in feet on Scale C. Move the indicator along Scale C to the distance required, then read the deflection angle on Scale A.

Where the total spiral deflection angle does not exceed 3 deg 20 min (200 min), the deflections can be read to 1 min of arc on an ordinary 10-in. slide rule.

BURTON G. DWYRE, M. ASCE
*Construction Engineer, New Mexico State Highway Dept.*
*Santa Fe, N.Mex.*

## Discrepancies in Metric System

TO THE EDITOR: Adoption of the metric system of weights and measures is again being urged. This method was weighed carefully by the English people in 1855, and rejected on the ground that it was not as efficient as the system then in use. The British system has since been improved by dropping tower weight and stone weight, adopting our decimal series of pound weights, and adding the imperial gallon (the volume of 10 lb of water).

The proposal was investigated by leading American manufacturers in the eighteen nineties and rejected. The respective merits of the two systems were listed by George W. Colles in Vol. 18 of the *Transactions* of the American Society of Mechanical Engineers. Since our system has since improved, while the metric system is unchangeable, I see no reason for thinking that a new investigation would produce a different conclusion.

The old belief that the foot was merely the length of some English king's foot was exploded by Edward Nicholson, in his *Men and Measures*, which was published in 1912. He showed that our foot, inch, and ounce were all traceable to Roman measures, in turn derived from the cubit of antiquity. The fathom and cable length are also based on the cubit, while the sailor's knot derives from the cable length.

The 360° division of the circle was a Babylonian concept. They first divided it into the six natural radius-chord divisions, then broke these parts into sixtieths, 60 being a "sacred" number in their religion. But the 30° and 15° factors of 60° were the basic divisions, not the 10° factors, as it appears to be in decimal notation.

The division of the year into 12 parts was made very early in history, and the dozen has existed ever since trade began. Makers of sun-dials found it convenient to divide the morning shadow into 6 parts, the Greek "hora" from which comes our 12-part clock face and 24-hour day.

This use of 6 and 12 as factors takes on new significance in the light of a statement by a University of Minnesota professor working in mathematical research, to the effect that the Roman secret trade guild commercial accountant employed colored stones (calc) in doing his work, and that there were twelve of each color. If this is true, the Romans then actually knew the secret of place value, and had a more completely integrated system of numbering, coinage, weights, and measures than is the modern decimal system. Their number base 12 was a factor of their circular measure and time systems, which is not true of 10 in the decimal system.

Apparently we have been the unconscious heirs to a part of the units of this system, without inheriting the number base which integrated them. Before we decide to discard them in favor of the metric units, we should make a thorough study of the obstacles in the way of adopting the number base. It is only by adopting base 12 that we can get the complete integration, which the advocates of the metric system praise so highly, but do not have. Study along this line is being carried on all over this country and England by the Duodecimal Society of America, 20 Carlton Place, Staten Island 4, N.Y. This group welcomes inquiries, carries on a forum discussion, and can furnish a bibliography.

Paul Van Buskirk, M. ASCE
*Detroit, Mich.*

## Metric Units Sometimes an Impediment

To the Editor: Many of the letters recently appearing in Civil Engineering fail to distinguish the metric from the decimal system, of which it is only one species. All must agree that, as long as our counting is based on 10, a decimal system of weights and measures is the best kind available. However, such a system need not be hampered by the impediments of current metric units, several of which are "either too large or too small."

This is not to pretend that even the decimal system is ideal, because 10 can be halved only once, whereas our natural craving is to halve, and then halve, and then halve again. This tendency is illustrated by the catalogs of French steel mills, where fractional dimensions appear, for example, as $10^{1}/_{4}$ millimeters, rather than as 10.25.

Inconsistencies like this could be reduced by the adoption of an octad system of numeration (based on 8 instead of 10), which would be perfect where three significant digits are required under our present system. But that must remain an iridescent dream, unless perchance we should lose both of our thumbs. In Wales the primitive base was 15, presumably sponsored by Druids who must have had either three hands, or else only one foot.

Standard metric units cannot be defended as being related to the size of the earth, because Napoleon's scientists made an error in computing the relation. The chief drawback to these units, however, lies in the awkward magnitudes they provide. Unless one happens to be a dry-goods clerk, or an Olympic sprinter, he seldom senses the length of a meter. As practical measures, only the millimeter and the powered centimeter are popular, and these mostly in office, laboratory, or high-precision plants. A similar restriction applies to the gram as a basic unit of weight.

Many of the metric units are not generally accepted by field and factory workers in nominally metric countries. Scandinavian peasants still substitute a native unit for the kilometer. Around the year 1900, the writer spent considerable time in old Mexico, where he had a chance to observe the metric system in operation. Blueprints were prepared in terms of the meter, but when they reached the shop, Aztec and Spanish mechanics set their tools to equivalent "pulgadas" (about one inch). The centimeter was too small for suitable subdivision, while the decimeter was unknown. Of course the smallest subdivision on scale or tape should be exactly the smallest standard measurement expected for the use in question.

Several correspondents have mentioned the danger of metric quantities being miswritten or misread, because their value depends upon the correct placing of one little dot. Chances for misinterpretation are enhanced by the practice, in some metric tables, of marking the decimal point by a comma instead of a period.

A fair conclusion is that the optimum practical system (or systems) of weights and measures should be necessarily based on 10, but implemented with units that reflect the inherent perception and use of common objects more closely than do current metric units. This is done in the United States monetary system. Why can't it be extended to other fields? Leave the French metric system to high-precision people, if they like its units, but let engineers use such other units as are suited to the broader needs of industry.

F. T. Llewellyn, M. ASCE
*Baton Rouge, La.*

## Fluid Mechanics in Engineering Curricula

To the Editor: Although there can be little disagreement with Professor Thomas on the importance of hydraulics to the civil engineer, the writer cannot agree with some of the conclusions he reaches in his article in the March issue.

Discussions of "hydraulics" vs. "fluid mechanics" are seldom clear or conclusive because the terms have never been clearly defined. Judging from Professor Thomas' interpretation of the terms and from the results of a recent Society committee report, the average civil engineer thinks of "hydraulics" as applicable to water and "fluid mechanics" to "gases and liquids other than water." This is scarcely the main point of distinction between the two terms—the essential characteristic of modern fluid mechanics is not so much a matter of content as of approach. Like other basic courses in mechanics, it stresses fundamental principles and analysis rather than final engineering solutions; like these (as Professor Thomas rightly points out), it must be followed in the various curricula by courses that stress engineering application and design.

The reference to the transplanting of "ideas and methods ... lifted bodily from aeromechanics and other sciences ... among the customary subjects of traditional hydraulics" seems to the writer to be a statement of a widely held misconception. Textbooks in the field do not give that impression, nor do they seem to place undue emphasis on these features. On the contrary, there appears to be a definite effort to extract and emphasize the principles which have wide application. Sometimes problems may not be directly useful to the civil engineer, while the principles behind them are absolutely necessary to a real understanding of fluid motion. Furthermore, as principles, they may be applicable to many fields. Thus mastery of these common basic principles should be the main objective of first courses in fluid mechanics; with principles really mastered, the applications will take care of themselves.

It seems unjust to blame courses in fluid mechanics for the fact that some graduates cannot solve simple pipe flow problems. The writer is confident that practically all fluid mechanics courses contain an adequate treatment of pipe flow, and is not aware of any first course in fluid mechanics that sacrifices coverage of pipe and open channel flow to "wind tunnel theory." Fluid mechanics courses do not and should not stress the various nomograms, tables, diagrams which may be used to get quick answers—this might be one of the functions of the later courses.

The writer sees Professor Thomas' skepticism on the subject of first courses in fluid mechanics as essentially a plea for early specialization at the expense of time spent on fundamentals. Such a step would tend to reverse the discernible and healthy trend of engineering education away from specialization. It overlooks the fact that the successful and versatile engineer is usually the one who has a broad understanding of fundamentals. It also appears to ignore the fact that an undergraduate trained in a given field frequently cannot secure a position in that field and thus must have a sound grasp of fundamentals to fall back on. Carried to its logical extreme, early specialization would ultimately result in separate first courses in hydraulics or fluid mechanics in the departments of civil, aeronautical, mechanical, and chemical engineering, and all students would study the applications of principles to their own problems but have little inkling of the tremendous scope of the subject.

A two-term course in statics and dynamics is usually given to all engineering students, presumably on the assumption that there will be plenty of opportunity to apply the principles later. Fluid mechanics occupies an analogous position; it is inconceivable that there are not enough principles of common interest in it for a one-term first course.

John K. Vennard, Assoc. M. ASCE
*Assoc. Prof. of Fluid Mechanics,*
*New York University*
*New York, N.Y.*

# SOCIETY AFFAIRS

*Official and Semi-Official*

## As We Recall the Philadelphia Meeting—

First on the list of things to be done is that letter of appreciation to Francis Friel and his energetic meeting committee for the most generous hospitality they showered on the 900 engineers and guests who attended the Spring Meeting. Arrangements were complete in every detail, whether the event was a technical session, a serious-minded conference, or a light-hearted social event. Next, attention should be directed to the many vital engineering problems discussed during the days of technical meetings.

From April 17 through the 19th, Philadelphia's Hotel Bellevue-Stratford was literally filled with technical sessions. Eight Divisions of the Society held meetings where special attention was given to public works of Philadelphia and Pennsylvania. Foremost among the problems discussed was the water supply and stream pollution situation in the area.

Yet, for reasons easily stated, many of the most pleasant hours were occupied with social gatherings, formal and informal, some scheduled and some not. At noon on the first day of the meeting, the Philadelphia members gave a luncheon in the hotel at which a crowd—so large that it overflowed the ballroom into adjacent parlors—received enthusiastically an address by Representative Carl Hinshaw of California. Speaking on engineers in public life, Hinshaw said that the critics of "the ordinary garden variety" of politicians should "speak out for good government and stop sitting back and waiting to be consulted." The address is printed in this issue on page 201.

Gay indeed was the gathering on Wednesday evening in the Grand Ballroom. For some it was a bit difficult to recognize the "steak an inch and a half thick," but the excellent dinner was followed by a lavish entertainment arranged by Lyle Jenne. Mention should be made of each and every one of the affairs so carefully planned; somehow through all ran the thread of spirited conversation, giving continuity to the whole meeting. There were so many old friends to greet and new acquaintances to make that it is no wonder that by Friday evening many a voice had dropped into a husky whisper.

### The Water Problem

It must be said that the Philadelphia engineers have done an excellent job in coping with several difficult water problems. Yet studies under way hold promise of still further improvement.

Elimination of culm, or anthracite coal fines, from the water of the Schuylkill River will be accomplished by a program explained by James H. Allen, Chief Engineer of the Interstate Commission on the Delaware River Basin. Under a cooperative agreement, mines will cease dumping culm into the stream and accumulations will be dredged out and reclaimed. Speaking before the Sanitary Engineering Division, Mr. Allen cited the discharge of nearly a million tons of waste coal and silt into the river each year, which has "literally smothered the entire length of the river." The resulting damage to navigation, flood control, recreational facilities, and water supply plants is staggering.

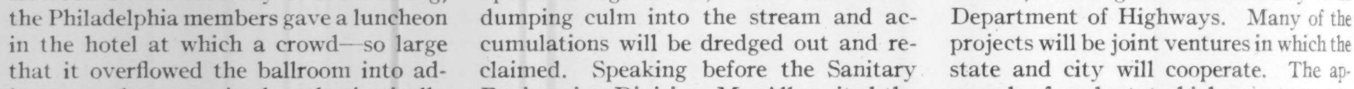
Cost of improvements necessary to prevent further discharge of culm into the stream will amount to about $6,000,000, to be borne by the mine operators. Dredging deposits will be undertaken by the Commonwealth of Pennsylvania and the federal government. The commonwealth in addition is to construct desilting basins on the headwaters of the river to catch any material that has inadvertently entered.

Another aspect of stream pollution was discussed by H. E. Moses, chief engineer of the Pennsylvania Department of Health. He related aspects of the program under way to prohibit contamination of surface streams with sanitary and industrial sewage. With legislative backing, state officers are enforcing measures which will clean up the rivers of Pennsylvania. A third in this series was the paper, "The Treatment of Water to Inactivate the Causative Agent of Infectious Hepatites," by Major James B. Baty, of the Sanitary Corps.

### Highway Discussed

Many improvements to the highway system of the Philadelphia area are being planned, as was brought out by John L. Herber, chief engineer of the Pennsylvania Department of Highways. Many of the projects will be joint ventures in which the state and city will cooperate. The approach of such state highways to metropolitan areas was covered more in detail by the State Highway Engineer of New Jersey, Charles M. Noble. Construction of freeways was held to be essential "to accommodate a vast volume of mixed truck and passenger-car traffic which makes up the sinews of our commercial and industrial life."

Cost elements were dealt with in some detail by Mr. Noble. Small communities



A Technical Excursion at Philadelphia Included Inspection of the Naval Air Experimental Station
Here Most Interesting Exhibits Had Been Arranged Especially for the Party, Which Paused for the Photo Above

especially are apprehensive of loss when major traffic arteries through their areas are contemplated. And well they may be. To alleviate the situation, Mr. Noble offers, "If a community through which a trunk artery is projected were offered forgiveness of a substantial portion of state and county taxes for a period of years, it is believed that it would be sufficient inducement to remove opposition to highway improvements in built-up areas."

The long-range developments brought about by highway research were outlined by Roy W. Crum, Director of the Highway Research Board. Mr. Crum also detailed future programs of the research board.

### Maintenance of Waterways

Costly maintenance of the Delaware River waterway was the subject of an address by L. D. Shuman, Head Engineer of the Philadelphia District Office of the Corps of Engineers. Involved is the dredging of 15 million cubic yards of silt annually from the Delaware's deep channel. The river was described by Mr. Shuman as being "a channel 33 ft deep and 3,000 ft wide through Philadelphia Harbor." The cooperation of local interests in providing private wharves, docks, and terminals was praised by the speaker.

Another condition of the Delaware River faced by engineers is the tendency to periodic disastrous floods, especially on its tributaries the Lehigh and Lackawaxen. Plans for flood control works on these streams were given by C. F. Wicker, Chief Engineer of the Philadelphia District Office of the U.S. Engineers. Works planned total nearly 20 million dollars and include reservoirs and channel improvements.

### Hydroelectric Power

In the operation of hydroelectric plants in northern climates, engineers have often been faced with the necessity of avoiding a shutdown or serious damage from ice. To prevent trouble, the engineer "has to start with the design of the plant," said Paul E. Gisiger, in his address to the Power Division. Mr. Gisiger, who is Structural Engineer of the Pennsylvania Water and Power Company, used extensive illustrations to show methods that have been used successfully in combating ice at power stations.

Also at the Thursday session of the Power Division, a paper on the "Coordination of Hydro Power and Steam Power in a Major Power System" was delivered by Robert E. Turner, hydrographer for the Susquehanna Electric Company. Mr. Turner outlined steps necessary to regulate production of power from several plants for maximum operating economy.

Improvements in surveying equipment depend not only on the accuracy of instruments but also on their durability. Many improvements have been made recently by private manufacturers working with the Army Engineer Board. The story of these developments and the use of new equipment in the war was related to an attentive Thursday afternoon gathering of the Surveying and Mapping Division by Lt. Col. W. S. Little. Colonel Little brought with him from Ft. Belvoir both American and captured enemy surveying equipment to display to the session.

State-wide systems of coordinates for surveying and mapping were discussed by B. E. Beavin, Project Engineer for the J. E. Greiner Company. Under these systems, which have already been adopted by many states, "there becomes available a reference framework for all engineering surveys." These may be used, "generally simplifying the administration of extensive engineering projects."

A third paper was presented at this session, that by David L. Mills, Engineer, with the Army Map Service, who gave a "Comparison Between Surveying Methods of the United States and Continental European Countries."

### Test Data on Structures

Additional tests for steel may be required if postwar construction is to adopt new high-speed procedures created during the war, according to Dr. D. F. Windenburg, Chief Physicist of the Navy's David Taylor Model Basin. Fractures of certain structures, for instance merchant ships, initiated as cracks which were "propagated so rapidly that a loud report was heard, similar to the report of a gun." He indicated that both methods of fabrication and properties of the materials should be carefully reviewed so that remedial specifications can be worked out.

A construction report was presented to this meeting of the Structural Division by E. L. Durkee, Engineer for Erection, Bethlehem Steel Company. Mr. Durkee related, and illustrated, the erection of the Pecos River Bridge. The structure was erected during the war, when many unusual conditions prevailed.

### Economic Trends

Speaking before the Construction Division on Thursday afternoon, Donald D. King, of the King Advertising Services, gave a detailed account of the "Economic Trends in the Construction Industry." A barometer of America's prosperity, the construction industry today has a backlog of more than 29 billion dollars—exclusive of housing. The rate at which this work can be done is indicated by the construction volume increase during the last half of 1945—61%. In each of the next four years it is expected that the increase will continue, at a rate of 50% in each year.

Opportunities to men—especially veterans—in the construction industry were pointed out by Day Okes, of the Okes Construction Company. Mr. Okes was chairman of the committee which recently issued the booklet on the subject entitled "Opportunity Unlimited," so it can be seen that his appraisal of the situation was based on an intensive study. Mr. Okes pointed out that employer cooperation was essential in placing veterans in the right kind of jobs for their capabilities.

### Subdrainage of Airfields

The Soil Mechanics and Foundations Division also held a session at Philadelphia. The entire time was given over to a symposium on subdrainage of airfields. A "Theoretical Analysis of Drainage of Base Courses" was presented by Prof. Arthur Casagrande of the Harvard Graduate School. Dr. Casagrande is working on a mathematical formula, while William L. Shannon, another speaker on the program, is working on models to check the formula, in an effort to improve and increase the bearing capacities of runway bases by speeding up drainage of subsurface waters. Mr. Shannon is an engineer at the Boston U.S. Engineer office.

On Thursday morning a second session of the Sanitary Engineering Division met to hear three interesting papers. Editor W. A. Hardenbergh of *Public Works* told of the growth of the Sanitary Corps during the war, in which he served as a colonel. His story of the many problems confronted by the Corps pointed out the essential character of its work in maintaining the high operating efficiency of the military forces.

Collection and disposal of refuse was the subject presented by Walter E. Rosengarten, Township Engineer of Ardmore, Pa. Mr. Rosengarten outlined processes found to be economical and practical by a small community.

At the meeting of the Construction Division, the development and use of new construction equipment was described. Lee F. Gibblen read the paper in the absence of its author, Lou R. Crandall, president of the George A. Fuller Company, a firm that helped build airfields in various places under extremely trying conditions.

### All This and an Excursion

Friday, after the last gavel had banged and the last speaker had subsided, Francis Friel, Joe Farrell, and their splendid excursion committee gathered together two large crowds. One they sent on a trip to various historical landmarks, the other to view engineering accomplishments. Perhaps the hospitality of the officers and men at the Navy Yard or the immensity of the Philadelphia Electric's new power plant should be dwelt on. Yet by some, the moment's relaxation, the refreshments, and the crabmeat cakes at the Bala Country Club will be as long remembered.

# Meeting of Board of Direction—Secretary's Abstract, April 15, 16, 1946

THE BOARD of Direction held its spring meeting at the Bellevue-Stratford Hotel in Philadelphia, Pa., on April 15 and 16, 1946. It was called to order on April 15 at 10 a.m. by President Horner; and present also were Past-Presidents Stevens and Pirnie; Vice-Presidents Howard, Hathaway, Harrington, and McNew; Directors Bryan, Critchlow, Crum, Gamble, Gardiner, Glidden, Haertlein, Hardesty, Huie, Koch, Panhorst, Piatt, Saville, Shannon, Thomson, Tipton, Tolles, Wilson, William N. Carey, Secretary and Executive Officer, and Treasurer Trout.

### *Vice-President Polk*

Regret was expressed at the untimely death of Vice-President Polk of Birmingham, Ala., representing Zone II, and announcement was made of the succession to the office of the senior Director of the Zone, Gail Hathaway of Washington, D.C. A committee was authorized to prepare a suitable memoir of Colonel Polk.

### *New Director Crum*

It was reported that, by letter ballot of the Board, Roy W. Crum of Washington was appointed to fill the unexpired term of Mr. Hathaway as Director from District 5. An item elsewhere in this section gives further details.

### *Minutes Approved*

Minutes of the Board for its meetings of January 14–15 and January 17, 1946, were approved with corrections; and of the Executive Committee for its meeting of January 12, 1946.

### *Executive Committee*

The Executive Committee met on April 13, and its actions and recommendations were approved by the Board on April 15.

### *Office Space*

Provision was made for studies and estimates looking toward remodeling of the Society's Reading Room to provide additional office space.

### *Aid of Engineering Foundation*

The Board authorized official requests for financial aid by the Engineering Foundation for five projects—three in in the field of hydraulic research and one each in column research and in soils and foundations.

### *Legislation re Atomic Energy*

Approval was given of the action of President Horner in signing a joint communication to Congress in support of the McMahon bill for control of atomic energy. (See separate item in this section re this letter.)

### *By-Laws Change—"Local Qualifications Committee"*

After due notice of the proposed change, the Board voted to amend the By-Laws, Art. I, Paragraphs 3 and 4-*f*, changing the name "Local Membership Committee" to a new designation, "Local Qualifications Committee."

### *Appointment of Secretary and Treasurer*

The present officers were reelected for the ensuing year, as follows:

Secretary and Executive Officer—William N. Carey, M. ASCE

Treasurer—Charles E. Trout, M. ASCE

### *By-Laws of Sections*

Acting on requests of the Sections concerned, the Board authorized amendments in the by-laws of the Montana and the Sacramento Local Sections.

### *Standards Work*

By invitation, M. N. Quade, M. ASCE, conferred with the Board, as Society representative on Standards Council (American Standards Association); and opinions were exchanged relative to the effective prosecution of Standards work in which the Society is collaborating.

### *Engineers Joint Council*

Various matters emanating from Engineers Joint Council were considered, including relationship of the profession to remedial labor legislation, scientific research legislation, technological advisory legislation, and other activities. National publicity for the accomplishments of E. J. C., particularly in the field of its work on Industrial Disarmament of Aggressor States (Germany and Japan) was strongly recommended.

### *Committee on National Capital*

Society affiliation on the Joint Committee on the National Capital was withdrawn, in the belief that its activities are more within the scope of the District of Columbia Local Section.

### *Headquarters Building*

Space needs to house the Society offices in a joint building with other societies were discussed; also methods of meeting these needs or increasing the facilities. Participation in a proposed Joint Planning Committee with other organizations was approved, looking toward the best development of the present building or the construction of a new one.

### *Appreciation of Librarian Craver*

The Board joined in approving the resolution covering the work of Harrison W. Craver as Director of the Engineering Societies Library, jointly with other Founder Societies, as detailed in a separate item on another page.

### *Appointments*

Various appointments were approved, including reappointment of the committees on the Freeman Fund and the J. Waldo Smith Fellowship, thus reactivating these opportunities for young engineers. The executive committee personnel for the newly formed Air Transport Division was also approved. Items elsewhere in this issue cover the details.

### *Staff Activities*

Quarterly reports from the staff were received and accepted, covering work in the Washington and Western offices, and on state salary surveys.

### *Spring Meeting 1947*

Allocation of the Society's 1947 Spring Meeting to Phoenix, Ariz., was approved.

### *Suggestions from Exploratory Conference*

Preliminary reports were received covering consideration by a number of committees about matters suggested by the exploratory conference in January 1946. In general, final Board action will await the conclusion of committee studies.

### *Mead Prize*

It was authorized that this prize be reactivated. The Committee on Professional Conduct noted that it expected to submit in July subjects for competition covering the year 1946–1947.

### *"Engineers Guild"*

On suggestion of its Committee on Employment Conditions, the Board recommended use of the term "Engineers Guild" whenever practicable, to designate professional engineering employee groups formed for purposes of collective bargaining.

### *Employment Conditions*

In line with recommendations of its Committee on Employment Conditions, the Board adopted policies looking toward remedial legislation re employment conditions for professional engineering employees, details of which are noted in another item in this issue.

### *Additional Field Secretary*

In order to prosecute the extensive activities of the Society in the areas not covered by the present Western representative, the employment of another field secretary was discussed. The Board withheld approval of such appointment for the present.

### *Commendation of Student Chapters*

On recommendation of the Committee on Student Chapters, the President was authorized to address letters of commendation to twelve Student Chapters, supplemented by letters of honorable mention to eight other Student Chapters. The list of Chapters so honored is given in full elsewhere in these pages.

### *Government Encroachment on Private Practice*

Extensive discussion developed the deep concern of the Board in the encroachment of governmental services in the field of private engineering practice. This resulted in a number of actions. It was the sense of the Board that federal agencies should do no major engineering work for foreign countries; that the directors of important government bureaus and offices doing major engineering work should be engineers; that with their expanding programs, governmental agencies at all levels should use engineers in private practice as much as practicable.

### *Society Interest in National Affairs*

The Board authorized the constitution of an action committee on national affairs, which should effectively carry Board recommendations to government officials, help in the selection of panels for suggestion of proper appointees, and conduct similar activities of professional scope.

### *Recommendations of Exploratory Conference*

Preliminary consideration was given to the various suggestions emanating from the exploratory conference held at Headquarters in January 1946. Many items had been referred to individual committees for recommendation. In the absence of committee action on all the matters involved, the Board did not complete its consideration of this large subject.

### *Budget*

A number of items in the budget were taken up for revision to meet immediate conditions and needs.

### *Various Committees*

Reports were received from many committees, including those on Juniors, Professional Objectives, Engineering Education, Publications, Securities, Professional Conduct, Retirement System, and a number of others.

### *Appreciation*

A resolution of cordial appreciation was adopted in recognition of the many courtesies shown by the Local Section for the Philadelphia Meeting, as well as for cooperation of the Bellevue-Stratford Hotel officials.

### *Adjournment*

The Board adjourned at 10:15 p.m., April 16, to meet next in Spokane, Wash., in July.

## Outstanding Progress of Student Chapters Recognized by the Society

A NUMBER of Student Chapters of the Society were recognized by the Board at its Philadelphia Meeting for their fine services during the past year. This practice of recognition has been in effect since 1935.

Recommendations are made by the Committee on Student Chapters following study of the official activities of the various Chapters. All regions of the Society are represented in the choice of the following to be thus recognized for outstanding accomplishment:

*Southern Region*
Duke University
University of Tennessee
Virginia Military Institute

*Middle-Atlantic Region*
Case School of Applied Science
Carnegie Institute of Technology

*North-Central Region*
University of Minnesota
Iowa State College

*Northeastern Region*
New York University
Brooklyn Polytechnic Institute (Evening Division)
College of the City of New York

*Western Region*
University of Colorado
Stanford University

In addition, the Board agreed with its committee on the desirability of according honorable mention to other Chapters, as follows:

*Southern Region*
University of Kentucky
North Carolina State College

*Middle-Atlantic Region*
Swarthmore College
Ohio Northern University

*North-Central Region*
University of Detroit

*Western Region*
University of Arizona
Oregon State College
University of Utah

The twenty Chapters whose activities are thus signalized, are to be congratulated for their fine showing. Their officers and members, who have worked so effectively, can feel real pride in the acknowledgment and recognition on the part of the Society as a whole. Individual letters of commendation will be sent to these Chapters by the President of the Society.

A Student Chapter Conference was Held in Conjunction with the Philadelphia Meeting
Nearly 200 Students from Engineering Schools on the Eastern Seaboard Attended. During an Excursion Which Was Part of the Conference the Group Visited the Philadelphia Navy Yard, Where This Photo Was Taken

# Military Experience as Society Membership Credit

FREQUENT inquiries have been made at Society Headquarters since V-E Day as to the weight given military experience when application is made either for membership or transfer. Many men who have been in the Service during the past four years have found that their technical records have been short of sufficient requirements to give them the advancement in membership they desired. Frequently such applicants have included experience of a non-technical nature.

The By-Laws of the Society specifically state the degree of responsibility expected of the applicant before admission or transfer to any grade. The Membership Qualifications Committee, while endeavoring to be liberal in its interpretation of experience records, recognizes the personal equation in the applicant's technical record and his desire to be fair in his own attempt at classification.

By "responsible charge of engineering work" is meant exactly that, regardless of whether such work was performed by the U.S.E.D. in Alaska, by the Seabees in Okinawa, or by a private engineering firm in the United States. There is neither penalty nor bonus for such engineering work performed under military direction. Responsible charge of the design or construction of important engineering structures is, therefore, a proper qualification for membership. To be in responsible charge, the applicant must be more than a draftsman, an inspector, or an instrument man. To begin with, he should have a technical training which will fit him for engineering leadership. A Junior should be able to exercise a limited amount of such leadership, but an Associate Member should be able to accept the technical direction of relatively large and complicated engineering structures. Members should have longer experience and be able to direct engineering works commensurate with the highest responsibilities of the profession.

As is evident, therefore, military experience that does not involve the design or construction of important engineering works, cannot be considered by the Society as qualification for either membership or transfer. Applicants are urged to include all their experience, but to set apart the time spent in non-engineering work. It has been the policy of the Society that where a Junior has reached the age of 35 during his military experience, and has not, therefore, been able to obtain the required year in which he had responsible charge, the dead-line year (that is, 35) may be extended by the number of years the Junior was in non-engineering military service.

WILLIAM D. SHANNON
*Chairman, Membership Qualifications Committee*

# Appreciation of Harrison W. Craver

BY ACTION of the Board at its Philadelphia Meeting, the Society joins with others of the Founder Societies in expressing appreciation for the long and valuable work of Harrison W. Craver as Director of the Engineering Societies Library. The resolution as adopted details these splendid services in the interest of all engineers, as follows:

"HARRISON WARWICK CRAVER

"Harrison Warwick Craver has served as Director of the Engineering Societies Library from 1917 to 1946. One of his first tasks was to consolidate into a single collection the libraries of the Founder Societies which had been maintained as separate collections up to that time. He also undertook and completed over a period of years a card catalog of those combined libraries. Through the institution of translation, abstracting, photostatic and loan services he gave the Library national scope.

"His skill as a librarian, his knowledge of applied science and engineering, his sound judgment, his zeal for his work and his unfailing courtesy have combined to provide an unequaled library service for the engineers of the nation.

"In token of its appreciation, the governing body of each of the Founder Societies, whose combined libraries constitute the Engineering Societies Library, has entered this minute on its official records and has directed that its seal be affixed to the copy to be presented to Dr. Craver."

# Remedial Legislation re Employment Conditions

AMONG the important activities reported by the Committee on Employment Conditions to the Board at its Philadelphia Meeting were those regarding legislation affecting the economic condition of engineers. The Committee recommended, and the Board approved, the following policies and courses of action for obtaining remedial legislation for professional engineering employees:

1. That definitions be prepared covering professional engineering employee and sub-professional engineering employee, which definitions will be acceptable to NLRB in defining units appropriate for collective bargaining.

2. That the Society work for the passage of laws to implement the policy of the Board re collective bargaining. The policy in question was listed in the Official Personnel Directory Number of PROCEEDINGS, February 1946, pages 41 and 42.

3. That the staff through its Washington representative be directed to take such action as seems appropriate to secure the inclusion of remedial legislation for professional engineers in bills concerning labor which are introduced into the Congress.

4. That the Society continue to cooperate with and support the activities of the Committee on Economic Status of the Engineer of Engineers Joint Council pertaining to employer-employee relations and remedial legislation.

# Navy Honor Awarded to Captain Beam

A SIGNAL honor has come to Carl E. Beam, veteran member of the ASCE headquarters staff in New York, in the form of a commendation and ribbon bar awarded him by the Secretary of the Navy. Mr. Beam, who returned to the staff last December after four and one-half years in the Navy, where he attained the rank of captain, has been a member of the ASCE staff since 1922.

Signed by James Forrestall, Secretary of the Navy, the citation which accompanied the bar and commendation reads:

"For outstanding service as a Member of the Board for Contract Awards of the Bureau of Yards and Docks, from May 19, 1941, to October 1945. By his knowledge of architectural and engineering contracts and his judgment in recommending fees on these contracts, Captain Beam rendered invaluable assistance to the Board for Contract Awards and the Bureau of Yards and Docks. His judgment, professional ability and devotion to duty reflect the highest credit upon himself and the United States Naval Service."

CIVIL ENGINEERING joins other staff members and friends of Captain Beam, both in the profession and outside, in congratulating him on this well-deserved honor.

### Notes from the Capital

*Occasional Information Transmitted by the Society's Washington Representative and Believed to Be of Special Interest to Civil Engineers*

# CPA's Restrictive Order on Construction

As a result of strenuous efforts on the part of men both in and out of government, the original proposals for the Civilian Production Administration's restrictive order on construction other than housing, were changed so that in final form it would still be permissible for a considerable volume of heavy engineering construction to go ahead. This is as it should be for at least two reasons. First, there is much needed work in fields other than housing which ought to go ahead. Second, the proposed housing program, large as it is, is entirely inadequate to absorb the full capacity of the construction industry. If there were to be prohibition of other types of construction, there would be resulting idleness of both equipment and labor on the part of producers of construction supplies and on the part of contractors who cannot properly be engaged in home building.

### Influence of Local Committees

Success of operations under the restrictive order depends very largely on the character of the local committees appointed to advise regional and district administrators of CPA (Civilian Production Administration) and on the caliber of those administrators. If poorly administered, the program easily can result in favoritism and injustice in granting authority for construction projects. It is to be hoped that these men will be carefully selected and will be of such character as to have the really best interests of the industry and country at heart.

There is a general belief on the part of those in the construction industry that such an order is not at all necessary. Dependable surveys conducted within the industry indicate ample capacity on the part of present producers of construction materials and equipment to supply not only the needs for the projected housing program but also of other construction sufficient to result in a volume greater than has ever been known in peace times. The solution of the whole problem is stimulation of production, and it seems entirely sensible that the way to encourage production is to increase ceiling prices in instances where the current prices do not make it possible for manufacturers and others to operate at a profit. This is a function of the OPA. The key to the solution of the problem is in the hands of that organization.

As a corollary, we are told that subsidies granted to so-called "marginal producers" should be available to bring added production facilities into the field. However, as subsidies are intended for inefficient organizations which are unable to stand under competition with experienced and efficient ones, the result is that all of us will be contributing toward the placing of a premium on inefficiency. Furthermore, these "marginal producers" will need time to get under way, and likely never will reach a position where they really can have any considerable effect on the situation. These are only a part of the good reasons why such a program cannot be effective.

There is one phase of the program which is worth noting. Throughout the life of the War Production Board, so-called Industry Advisory Committees were appointed by WPB. There were some sixty or more such committees, each one composed of individuals drawn from a specific industry. There never was such a committee for the construction industry. The Department of Justice ruled that the construction industry was so heterogeneous in character, including both sellers and buyers of goods and services, that it would be improper to have a committee for that industry.

The question now arises as to whether the Local Advisory Committees now being set up in connection with the restrictive order, might not fall under the same ruling. The general thought is that when one applicant is refused permission to go ahead with a project while another one is permitted to do so, the result may be construed as action in restraint of trade and may become a violation of the Sherman Act. Certainly it is to be hoped that the members of these committees will be men of ability and integrity and that some qualified engineers will be selected. However, in spite of the fact that the CPA administrators make all the final decisions and that the decisions may or may not be in accord with the advice of the committees, there is the possibility that the committees, regardless of how upright and conscientious they may be, will find themselves in a very awkward situation. This matter has been brought to the attention of officials of CPA here in Washington and it is to be hoped that there will be a ruling from the Justice Department to make the situation entirely clear.

# St. Louis Dinner Honors President Horner

A reception and dinner attended by two hundred engineers was held in honor of W. W. Horner, President of the Society, on Friday evening, April 5, 1946, at the Congress Hotel in St. Louis, Mo. Brief salutations on this occasion were given by Mayor Kaufmann, Chancellor Arthur H. Compton of Washington University, A. P. Greensfelder, Prof. Ralph B. Wiley of Purdue University, and Ernest E. Howard, Kansas City consulting engineer. Mr. Horner responded with a short address on "The Civil Engineer Serves the Public." William Harrison Furlong, United States representative on the National Highway Direction of the Republic of Mexico, gave an illustrated talk on "Life Along the Pan-American Highway,"

View During Dinner Shows Part of Large Gathering

President Horner Responds—Also in Photo are Mrs. Horner, Mayor Kaufmann Director Thomson, and Vice-President Howard

and showed moving pictures of resort life in Mexico. Robert B. Brooks, St. Louis consulting engineer, presided, and Harry F. Thomson, a Director of the Society, served as toastmaster.

Distinguished guests other than those that have been mentioned included Prof. Wilbur M. Wilson of the University of Illinois; Prof. E. W. Lane of the University of Iowa; Milton M. Kinsey, President of the Board of Public Service of the City of St. Louis; Dr. Jules Bebie, President of the Engineers' Club of St. Louis; William B. Ittner, Jr., President of the St. Louis Chapter of the American Institute of Architects; Prof. Carl Tolman of Washington University; and Ernest B. Black, Past-President ASCE.

This recognition of Mr. Horner in his home city is most fitting. He is the first St. Louis engineer to have the honor of being national President of the Society since 1913, when the late Col. John A. Ockerson held that office.

A biographical sketch of Mr. Horner appeared in the December 1945 issue of Civil Engineering (page 568) and a more extensive write-up in the February 1946 issue (page 75).

## Junior Dues Remitted to Graduates Who Went Into Armed Forces

A new policy has been initiated by the Society's Board of Direction with regard to graduates of engineering schools who entered military service immediately upon graduation without joining the Society as Juniors. Such men may have their first year's dues remitted if they send in their application for the grade of Junior within sixty days after being contacted.

This policy was recommended at the Exploratory Conference on Membership in January—prior to the Annual Meeting. The recommendation was re-phrased and quoted in the Board minutes of January 17, 1946. Including a further change in wording approved at the Board's recent April meeting, the recommendation reads:

"Many former members of Student Chapters went into the armed forces immediately or almost immediately after graduation. The same privilege which is now extended to new graduates, namely, remission of first year's dues, should be extended to graduates who went into the armed forces immediately after graduation, and who apply promptly (approximately within sixty days) after being contacted. An extensive campaign should be conducted by the Staff to accomplish this end, and this privilege should be terminated not later than December 31, 1947."

The Board voted in January to direct the Secretary and Executive Officer to conform to this recommendation. Briefly, it means that the dues remission privilege ordinarily extended to graduates who apply for admission within sixty days of date of degree shall be granted also to graduates who went into the armed forces if they apply for admission within sixty days after the Society's first contact with them, such privilege to terminate not later than December 31, 1947.

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## Cooperative Engineering Councils Surveyed

*By* **Frank Sanford**

Past-President, Technical and Scientific Societies Council of Cincinnati

*This survey was conducted by the Cincinnati Council under the personal direction of Mr. Sanford. Results were first printed in "The Engineer and Scientist" and were later reprinted in full by "Mechanical Engineering" and "Electrical Engineering." This item is but an abstract of the original article.*

Formation of local councils of engineering, technical, architectural and scientific societies is a movement that is rapidly gaining strength across the country. Provision of a medium for cooperative action among local sections of national societies and local clubs or societies of engineers is the principal purpose of these council organizations. New individual memberships are not involved, but members of all constituent groups are members of the council through affiliation of their organization.

Local conditions and purposes have governed the arrangements made, and in general there has been no outline or guidance on a national scale. Local committees planning councils have often sought some suggestions from a few other cities but, so far as we have been able to learn, no general review has been made of the various arrangements in use. The Cincinnati Council has sponsored this survey of cooperative plans in other cities, in recognition of its own tenth year of operation.

Information from 35 local organizations has been reviewed in this survey. About 400 local sections and societies and 100,000 individual members are represented in the councils or affiliate arrangements.

Four of these cooperative council plans have been in operation 25 years or more. Six more were added by 1930, eleven in the period 1934 to 1939, and ten since 1940. Of the latter, five councils were started last year. Four additional councils are now being organized.

Two Founder Societies, AIEE and ASME, are in every council of the survey, with a third, ASCE, missing in only five cases. A Professional Engineers' Society, most frequently a chapter of NSPE, is listed in two-thirds of the reports. Architects are represented in about one-half, and ASM, ASTE, AWS, ASHVE, ACS, AICE, IRE, IES, AFA, AIME appear in smaller numbers. This latter group, and some others, are included in the larger cities or larger industrial centers, apparently wherever there are local sections.

Except in four cities, the average council includes ten member societies—four with 15 to 17 members, four with 5 or 6, and the majority with 8 to 12 societies. Cleveland and Chicago with 33 societies, Detroit with 28, and Pittsburgh with 25, cover a much broader scope of organization than this average.

### Outline of Purposes

Cooperative action by the member societies on matters that are beyond the scope of the individual organizations is the primary purpose stated. A means is provided on a broad scale to promote the public welfare whenever technical, engineering and scientific knowledge and experience are involved or can be useful.

Provisions are made for vocational guidance for technical students, coordination of program activities, encouragement of joint meetings between two or more societies. Annual joint meetings of all societies are arranged by several councils. Coordination is a stated purpose, but there is no direct jurisdiction over the meetings or actions of the constituent societies.

In all of the council plans reviewed, the affairs are administered by two representatives or delegates, or by one delegate and an alternate, from each society. They are usually regular officers of the member society or, in a few cases, they are appointed for the council. Meetings of the Council, Governing Committee or Board are held three or four times each year, or annually and as called by the chairman.

Perhaps the organization plans can be classified into three broad groups or types, although the lines of separation in type are not sharp:

1. A local engineers club or society sponsors local section affiliation or participation in a council. Joint memberships are encouraged by several local societies, by a reduction in dues for members of affiliated societies.
2. Local sections have organized the council, usually with a local club participating as one of the members.
3. A combination of the two plans appears in a few cases, including our Cincinnati Council. The local society and local sections of national societies are members of the council, with the local society performing certain services for the council.

## Death of Henry D. Dewell, Former Director and Vice-President

Members of the Society will be saddened to learn of the death of Henry D. Dewell, former Director and Vice-President, who passed away in Berkeley, Calif., on March 20, 1946. Mr. Dewell, who was 64, was an authority on timber structures and earthquake-resistant construction.

Most of his career was spent in California, where he was educated, graduating from the University of California in 1906 with the degree of B.S.C.E. Following his graduation, he spent several years with Howard and Galloway, San Francisco architectural and engineering firm, which he served successively as assistant engineer, structural engineer, and principal assistant engineer on various Pacific Coast construction projects. From 1912 to 1915 he was chief structural engineer, assistant superintendent of building construction, and then engineer of domestic water supply and distribution for the Pacific International Exposition, held in San Francisco.

At the close of the exposition he established a private practice in San Francisco, which he maintained until his death. Of recent years he had been associated with his son, Robert D. Dewell.

Long a member of the Society, Mr. Dewell served as Director from 1925 to 1927, and as Vice-President in 1934 and 1935. He had been chairman of its Committee on Local Sections, and a member of its Committee on the Effect of Earthquakes on Engineering Structures. He had also been active in the San Francisco Section, of which he was president in 1930.

Henry D. Dewell, 1861–1946
Former Director and Vice-President

## Society Medals, Prizes and Awards

"The objects of the Society shall be the advancement of the sciences of engineering and architecture in their several branches, the professional improvement of its members, the encouragement of intercourse between men of practical science, and the establishment of a central point of reference and union for its members." (ASCE Constitution, Art. 1, Sec. 3".)

One of the important activities of the Society, too seldom appreciated, which sustains the foregoing objective, is the field of "medals, prizes and awards." In a large sense it keeps before the profession a standard of excellence in special areas that becomes the ingrained possession of each of its members. In a personal, or individual sense it offers members (especially young members) a specific aim and a guide for special professional effort. Details of "rules and regulations" need not be repeated here since they are standard content of the Society's annual Yearbook. Certain advantages, however, deserve reemphasis:

It is convenient to classify the subject as follows:

1. Prizes awarded on recommendation of the Society's Committee on Prizes
2. Prizes awarded on recommendation of the Society's Committee on Professional Conduct
3. Prizes awarded on recommendation of Technical Division committees on prizes
4. Joint awards of engineering societies
5. Fellowships, scholarships, and memorials
6. Memberships

Groups 1 to 4 are concerned mostly with rewards of merit for writing technical papers. With one exception (Group 2) there is no way to register for competition. All technical papers published by the Society automatically are entered in competition, each one according to the rules of the particular prize. The Society prizes (the "Big Six") are: the Norman and the Croes medals, for "contributions to engineering science"; the Rowland Prize ($60 in cash) and the Laurie Prize ($40 in cash) "for papers describing in detail accomplished works of construction"; the Wellington Prize ($75 in cash) for transportation papers; and the Collingwood Prize ($50 in cash) for Juniors.

Three Society Divisions offer specialty prizes for papers and discussions in the fields of hydraulics, sanitary engineering, and construction: The Hilgard Prize ($50 in cash), the Stevens Prize (books valued at $50), the Hering Medal, and the Construction Engineering Prize ($50 in cash). All papers by young members of the Society automatically become eligible to compete for the Alfred Noble Prize ($350 plus travel fare) awarded by a joint committee of the Founder Societies and the Western Society of Engineers.

The Society's Committee on Professional Conduct, in 1939, was enabled to offer two prizes for papers on professional ethics through the generosity of Daniel W. Mead, Past-President and Hon. M. ASCE—the Junior award for $50 and the Student award for $25. Unlike the foregoing prizes, three are for papers specifically entered in competition, the closing date for receipt of papers in any year being July 1.

Fellowships and scholarships within the power of the Society to grant are the Freeman Fund (earnings from $23,400 held in trust) and the J. Waldo Smith Hydraulic Fellowship ($600 to $1,000). The Society, through a regularly appointed committee, has been invited to nominate a scholar for the study of civil engineering at Columbia University ($380 per year).

Aside from Honorary Membership in the Society, many engineers consider that the highest recognition a civil engineer can receive for a lifetime of distinguished service to his profession is the John Fritz Medal. The Board of Award consists of sixteen members, four each from the four Founder Societies. By precedent these have been selected almost entirely from the roster of past-presidents. In addition the Society has representatives on committees for the Washington Award (medal of the Western Society of Engineers), the Hoover Medal (American Society of Mechanical Engineers), and the Marston Medal (Iowa State College).

The Society has accepted the custodianship of two memorial plaques—the J. Waldo Smith Memorial Plaque at Ashokan Dam and the Merritt H. Smith Memorial Plaque at Kensico Dam, both on the great Catskill Water Supply System for the City of New York.

Members so minded can find a source of personal satisfaction in furthering the purposes of the Society's prizes and awards by a cash gift or legacy. There is still room for specialty awards such as for papers—or discussions—in city planning, engineering economics, irrigation, power, soil mechanics and foundations, structures, surveying and mapping, and waterways. Such prizes advance the science of engineering by encouraging the publication and testing of valuable new ideas and, in the process of publication, by evolving higher standards of authorship and discussion.

Scholarship trusts, in particular, offer a means whereby a man may do honor in perpetuity to his alma mater and to his Society at one and the same time. Some day a successful civil engineer is going to recall the inestimable value of attendance at Society meetings in his professional career. Then perhaps a fund could be devised that would make it possible for young members from relatively far-away places to attend a Society meeting—"central point of reference and union for its members."

## Committee for Air Transport Division

ACTIVE functioning of the Society's new Air Transport Division has begun, following appointment of members to its first executive committee. Chairman of the group is Alfred J. Ryan, M. ASCE, consulting engineer of Denver, Colo. Mr. Ryan, who has participated actively in the formation of the Division, stated the need for a new approach to the integrated problems of air transport as follows:

"The rapid development of air transportation indicates that the provision of facilities for this method of transportation will soon become one of the major fields of endeavor for civil engineers. The principal engineering features involved in the development of these facilities are not new and are well represented by other existing Technical Divisions of ASCE, but in a great many cases the requirements and methods of application of basic principles are radically different from those covered by these other Divisions.

"It is my belief that this new Division will provide opportunity for the considerations necessary in the overall analysis of air transportation facilities and the accompanying methods of applying the various engineering principles. The new Division is devoted entirely to that field and will assume responsibility for guiding the development of methods of applying engineering principles in a manner that will be most beneficial to air transportation."

Other members of Mr. Ryan's executive committee are:

H. Shifrin, M. ASCE, Vice-Chairman, Consulting Engineer of St. Louis, Mo.

C. J. McCarthy, M. ASCE, Vice-President of the United Aircraft Corporation in East Hartford, Conn.

George W. Burpee, M. ASCE, President, General Aniline and Film Company, New York, N.Y.

One other member of the executive committee remains to be appointed.

## Freeman Fund—Open for Business

IN 1924, the generosity of John R. Freeman, an Honorary Member of the Society, made possible the establishment of a fund for:

1. Grants toward expenses for experiments, observations, and compilations to discover new and accurate data that will be useful in engineering;
2. Underwriting fully or in part some of the loss that may be sustained in the publication of meritorious books, papers, or translations pertaining to hydraulic science and art which might, except for some such assistance, remain mostly inaccessible;
3. A prize for the most useful paper relating to the science or art of hydraulic construction;
4. A traveling scholarship, open to members younger than 45 years, in any grade of membership, in recognition of achievement, or promise; and for the purpose of aiding the candidate to visit engineering works in the United States or any other part of the world where there is good prospect of obtaining information useful to engineers;
5. Assisting in the translation, or publication in English, of papers or books in foreign languages pertaining to hydraulics.

Item No. 4 was the project closest to Mr. Freeman's heart, and in the intervening years many young men traveled in Europe, fortified mightily by personal letters of recommendation from the donor himself. World War II brought these activities to a halt; but now the committee wishes again to offer the benefits of this award to a member less than forty-five years of age, in any grade of membership, for aid in a project included in one of the five items for the undertaking of which the applicant is particularly qualified.

To register for this competition, or to secure additional information, an applicant should address a letter to the chairman of the Freeman Fund Committee (Malcolm Pirnie, 25 West 43d Street, New York 18, N.Y.), describing if possible the nature and scope of the project he proposes to explore. The committee will study the applications during the summer months.

## Conference on Highway Safety

AN IMPORTANT part of highway safety can and should have its inception on the drafting boards of highway engineers. Their efforts as designers of safe thoroughfares should be coordinated with the work of other engineers skilled in the art of making traffic flow safely and smoothly in the interests of American living and commerce. In that belief, members of ASCE will be represented at the President's Highway Safety Conference to be held in Washington, May 8, 9, and 10.

One of the important committees appointed to contribute to the development of a program to combat the heavy losses in life on the highways, particularly since the appalling increase in traffic fatalities which followed V-J Day and the removal of gasoline rationing restrictions, is the Committee on Engineering. This committee had it's first meeting in Washington March 28 and 29, and inaugurated its program. It will evaluate the dominant characteristics of design, construction, maintenance and operation, as well as traffic control devices and techniques to aid in the reduction of traffic accidents, and will recommend appropriate engineering measures for adoption, indicating steps to be taken in the immediate future and those for long-term planning.

Gibb Gilchrist, Assoc. M. ASCE, President, Agricultural and Mechanical College of Texas, is chairman of the Committee on Engineering. Officially invited to represent the ASCE on this committee are Col. William N. Carey, Secretary and Executive Officer of the Society; Day I. Okes and George M. Shepard of St. Paul, Minn.; Col. William J. Shea, of New York, N.Y.; and John W. Wheeler of Chicago.

As president of ASCE, W. W. Horner of St. Louis has been invited to attend the Conference in May as a member of the Committee on Organized Public Support. He has appointed E. L. Chandler, of the Society's Washington office, as his alternate.

Other ASCE members serving on the Committee on Engineering are: James A. Anderson, Richmond, Va.; H. C. Coons, Lansing, Mich.; William J. Cox, Hartford, Conn.; Willard Chevalier, New York, N.Y.; Roy W. Crum, Washington, D.C.; Dean N. W. Dougherty, University of Tennessee, Knoxville, Tenn.; F. E. Everett, Concord, N.H.; H. W. Giffin, Trenton, N.J.; Fred J. Grumm, Sacramento, Calif.; Harold F. Hammond, Washington, D.C.; Harry B. Henderlite, Baton Rouge, La.; H. E. Hilts, Washington, D.C.; Burton W.

Marsh, Washington, D.C.; Donald M. McNeil, Pittsburgh, Pa.; D. Grant Mickle, Washington, D.C.; Ralph A. Moyer, Ames, Iowa; Lacey V. Murrow, Washington, D.C.; Wardner G. Scott, Lincoln, Nebr.; J. Trueman Thompson, Baltimore, Md.; Charles M. Upham, Washington, D.C.; and Joseph L. Wehmeyer, Detroit, Mich.

In a recent address, Maj. Gen. Philip B. Fleming, Federal Works Administrator and General Chairman of the President's Highway Safety Conference, stated:

"As the President has observed, higher standards of engineering will contribute greatly to public safety, but rebuilding streets and highways is a slow process and sudden benefits cannot be expected. Consequently we must look elsewhere for immediate assistance."

The Committee on Engineering also will examine the results of a study being made by the Public Roads Administration in cooperation with the American Association of State Highway Officials, looking toward the standardization of street and highway markers, and directional and warning signs. Ambiguous, obscure, and conflicting highway directions are a definite national problem, according to General Fleming.

"In addition," he said, "I believe more thought should be given to the possibility of standardizing driving regulations throughout the country. So long as we cling to our antiquated gridiron pattern of city streets there will always have to be some special rules to take care of special situations."

Conference officials have also pointed to another safety problem which will grow out of the coming national road program. The matter of caution to motorists who travel roads where new construction projects are under way will be considered in an effort to minimize the danger to workmen on the roadways. Numerous detours, which will come directly out of the new construction program, and their proper markings will also be a consideration.

Preparations for the President's Highway Safety Conference are well under way and a large attendance is expected when the meeting convenes on May 8. The 48 governors have been invited to head their respective delegations and it is anticipated that they will select a representative group of highway and motor vehicle officials, together with others from safety organizations and individuals with a basic interest in the problem, to constitute their official group. Representatives from the federal departments and agencies with a basic interest in the safety problem are also to be invited.

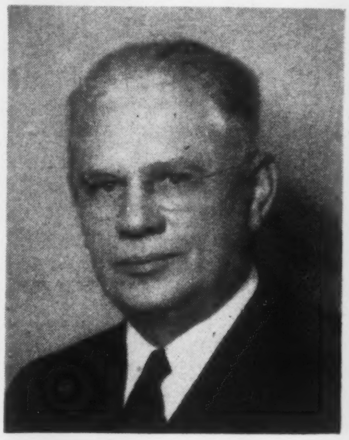
Thomas H. MacDonald, Public Roads Commissioner, is chairman of a coordinating committee entrusted with organizational plans for the conference. Colonel Light B. Yost, assigned to the Office of the Secretary of War, has been placed on special detail as executive director of the conference.

Chairmen of the other committees which will submit reports to the Conference are: Dr. George Gallup, Accident Records; Dr. George D. Stoddard, Education; Arthur Vanderbilt, Enforcement; Justice Owen J. Roberts, Laws and Ordinances; Roy A. Roberts, Motor Vehicle Administration; Paul Hoffman, Organized Public Support; and William J. Scripps, Public Information.

## Roy W. Crum Is New Director for District 5

By recent action of the Board of Direction, balloting by mail, Roy W. Crum has been appointed Director of the Society from District 5 to fill the unexpired term of Gail A. Hathaway. As noted in the April issue, Mr. Hathaway has been elevated to the office of Vice-President from Zone II by reason of the death of Col. A. C. Polk.

Mr. Crum was graduated from Iowa State College in 1907 with a B.C.E. degree, and in 1914 received the degree of C.E. from the same college. From 1907 to 1919 he was on the staff of his alma mater—first as an instructor and then as associate professor of civil engineering. During most of this period he was also connected with the Engineering Experiment Station at Iowa State College. From 1919 to 1928 he was engineer of materials and tests for the Iowa State Highway Commission. And since the latter year he has been director of the Highway Research Board of the National Research Council.



Roy W. Crum
Society Director from District 5

His duties for the Council include the editorship of the Proceedings of the Highway Research Board and of Highway Research Abstracts. Mr. Crum is also the author of numerous articles on highway finance, economics, and engineering, which have appeared in Society and other technical publications.

His affiliation with the Society dates back to 1913, when he became an Associate Member. He has been a full Member since 1920. He has also been active in the District of Columbia Section, and in 1944 served as president. The unexpired term of Director, which he is to fill, extends to January 1947.

## Approve McMahon Atom Bill

Presidents of four national engineering societies sent a statement to Senator Brien McMahon, Chairman of the Committee on Atomic Energy, supporting the provisions of Senate Bill 1717. This legislation would place responsibility for control of the development of nuclear energy in the hands of a federal civilian commission. Text of the letter to Senator McMahon follows:

"The undersigned address you as individuals who believe that the greatest possible advantage should accrue to the public welfare from the use of nuclear energy. Our profession has already contributed largely to the development of nuclear energy, several thousand engineers having been associated in engineering responsibilities in the work of the Manhattan District. We know of the destructive use of nuclear energy but our interest is in its greater use for public good.

"We agree in general with the provisions of your Senate Bill 1717 as heretofore published. We believe that the federal administration of all matters dealing with materials fissionable by chain reaction should be in the hands of agencies that are essentially civilian in make-up. We believe that the federal government has a responsibility for the safe use of these materials. We believe that the greatest advantage from the use of these materials will be for civilian industrial purposes. In the interest of these greater uses of nuclear energy we believe that the widest opportunity should be given for industrial research under Commission license. All use of nuclear energy for industrial purposes should be under license by the Atomic Commission but with the facilities owned by industry.

"In a forward-looking program of the extent required to develop nuclear energy for industrial purposes, it is important that sound judgment in the use of time, money and material should be applied to the work of the Atomic Commission. Engineers in performing their daily tasks are concerned with economy in the uses of time, money and material. As reported in recently published amendments to your Bill, the inclusion of a Division of Engineering in the Commission meets this need. We appreciate its addition and are confident that the Division will prove its worth and your wisdom in including it.

"We appreciate the tremendous responsibility you have undertaken in starting a policy for this Nation to follow in dealing with this new source of useful energy.

"W. W. Horner, President, American Society of Civil Engineers

"D. Robert Yarnall, President, American Society of Mechanical Engineers

"William E. Wickenden, President, American Institute of Electrical Engineers

"James G. Vail, President, American Institute of Chemical Engineers"

Despite the fact that atomic energy as presently available is essentially in the form of high intensity heat, not readily convertible to useful forms, authoritative sources confidently expect that means for conversion will be developed. At that time many industrial uses of the energy will be possible. Such use would be highly competitive in view of the low cost of such energy as compared with electrical energy as commercially provided at present.

## Committee on Ports and Harbors Organized in Waterways Division

A new committee of the Waterways Division has been organized by authorization of the Society's Board of Direction. The full name of the new committee is Committee on Construction and Operation of Ports and Harbors and Necessary Structures. Its declared purpose is:

"To study and report on problems affecting the planning, design, maintenance and operation of ports and harbors, including coordination of port and harbor development with the needs of the locality and those of transportation interests; the possibility of future expansion to meet future needs; types of docks, breakwaters, jetties, handling equipment, and other facilities."

The Committee was appointed by Col. C. L. Hall, Chairman of the Waterways Division, on authorization of the executive committee of the Division. The membership of the new Committee on Ports and Harbors is as follows:

R. W. Abbett, Chairman, Knappen Engineering Company, New York, N.Y.
John Ayer, Fay, Spofford and Thorndike, Boston, Mass.
C. G. Cappell, W. Horace Williams Company, New Orleans, La.
C. T. Leeds, Leeds, Hill and Jewitt Los Angeles, Calif.
C. K. Panish, U.S. Engineer Office, New York, N.Y.
E. G. Speyer, Commissioner of Public Works, City of Buffalo, N.Y.
F. G. White, Chief Engineer, Board of State Harbor Commissioners, San Francisco, Calif.

## *Appointments of Society Representatives*

Charles B. Burdick, M. ASCE, has been reappointed one of the Society's representatives on the Washington Board of Award for a two-year term, ending in May 1948.

William N. Carey, Secretary and Executive Officer, ASCE, has been appointed a member of a special panel of the Engineers Joint Council Committee on Economic Status of the Engineer. In cooperation with E.J.C.'s Subcommittee on Collective Bargaining for Engineers, the panel, if completed by appointments from all of the constituent societies composing E.J.C., is charged with the preparation of a statement of policy respecting remedial labor legislation. The Society's other representatives on the Committee on Economic Status of the Engineer are Carleton S. Proctor and Ernest J. Stocking.

William H. Hall, M. ASCE, was appointed to represent the Society at the sesquicentennial celebration of the University of North Carolina at Chapel Hill on April 12 and 13.

George J. Schroepfer, Assoc. M. ASCE, was appointed to represent the Society at the inauguration of James L. Morrill as president of the University of Minnesota and to attend a two-day educational conference at the University of Minnesota.

Charles M. Spofford, M. ASCE, has been reappointed the Society's representative on the Hoover Medal Committee for a six-year term, ending in May 1952.

Arthur S. Tuttle, Past-President, ASCE, was appointed to represent the Society at the ceremonies incident to the installation of President Houston of Rensselaer Polytechnic Institute on March 9.

G. G. Werner, Assoc. M. ASCE, has been appointed to represent the Society on the Engineers Joint Council Committee on National Defense.

Harold E. Wessman, M. ASCE, has been appointed to represent the Society on the Research Procedure Committee of the Engineering Foundation for the fiscal year, October 1, 1945, to September 30, 1946.

Sherman M. Woodward, Hon. M. ASCE, has been appointed to represent the Society on the Marston Medal Board of Award for a four-year term, ending September 30, 1950.

# News of Local Sections

## Scheduled Meetings

Alabama Section—Two-day session, luncheon, and dinner at the Thomas Jefferson Hotel, beginning on May 3, at 10 a.m.

Central Ohio Section—Dinner meeting at the Oxley Tea Room on May 16, at 6 p.m.

Colorado Section—Dinner meeting at the Oxford Hotel on May 13, at 6:30 p.m.

Connecticut Section—Dinner meeting at the Faculty Club on May 22, at 6:30 p.m.

Dayton Section—Luncheon meeting at the Engineers' Club on May 20, at 12:15 p.m.

District of Columbia Section—Evening meeting at the Cosmos Club on May 21, at 8 p.m.

Georgia Section—Luncheon meeting at Davison's Tea Room on May 3, at 12:30 p.m.

Lehigh Valley Section—Regular meeting at the Packard Laboratory on May 13, at 8 p.m.

Los Angeles Section—Dinner meeting at the University Club on May 8, at 6:30 p.m.; dinner meeting at the University Club on May 22, at 6:30 p.m.

Louisiana Section—Smoker at the St. Charles Hotel on May 27, at 8 p.m.

Maryland Section—Dinner meeting at the Engineers' Club on May 22, at 6 p.m.

Metropolitan Section—Technical meeting in the Engineering Societies Bldg. on May 15, at 8 p.m. Technical Meeting of the Junior Branch in the Engineering Societies Bldg. on May 8, at 7:30 p.m.; dinner meeting on May 22.

Mid-South Section—Spring meeting at Vicksburg, Miss., on May 10 and 11. Program includes inspection of the Waterways Experiment Station.

Northwestern Section — Dinner meeting at the Minnesota Union on May 6, at 6:30 p.m.

Philadelphia Section—Joint meeting with Engineers' Club of Trenton on May 16, at 7:30 p.m.

Sacramento Section—Regular luncheon meetings at the Elks Club every Tuesday at 12 m.

St. Louis Section—Luncheon meeting at the York Hotel on May 27, at 12:15 p.m.

**San Diego Section**—Dinner meeting at the U.S. Grant Hotel on May 23, at 6:30 p.m.

**Tennessee Valley Section**—Smoker and dinner meeting of the Chattanooga Sub-Section at the Patten Hotel about May 28, at 5:15 p.m.

**Texas Section**—Spring meeting at the Roosevelt Hotel, Waco, on May 9, 10, and 11. Luncheon meeting of the Dallas Branch at the Adolphus Hotel on June 3, at 12:15 p.m.; regular meeting of the Fort Worth Branch at the Blackstone Hotel on May 13, at 12:15 p.m.

**West Virginia Section**—Inspection and dinner meeting at the Daniel Boone Hotel, Charleston, on May 24. Meet at the hotel at 3 p.m. for trip to the new Kanawha County Airport; dinner at 6:30 p.m.

**Wisconsin Section**—Dinner meeting at the Ambassador Hotel on May 15, at 6 p.m.

## Recent Activities

### Buffalo Section

The speaker at the February luncheon meeting of the Section was Fred O. Francis, chief engineer of the John W. Cowper Company, who spoke on the damage done by fire to the cereal factory of General Mills, Inc., shortly after its completion, and described the repairs. Three members of the Corps of Engineers, U.S. Army—Col. Herbert D. Vogel, Lt. Col. W. J. English, and Maj. R. P. Kline—were guests of the Section on March 20. All discussed different aspects of our engineering operations in the southwest Pacific during the war, emphasizing the tremendous scope of our operations against the Japanese.

### Central Ohio Section

On March 20, members of the Central Ohio Section heard Benjamin H. Palmer speak on the subject of problems in the manufacture of concrete pipe. Mr. Palmer, who is production engineer and sales manager for Ohio of the Universal Concrete Pipe Company, outlined the principal methods of manufacture, their advantages and disadvantages, and successes and failures in attempts to improve methods.

### Cincinnati Section

The Section participated in the annual joint meeting of the Technical and Scientific Societies Council of Cincinnati on March 1. The combined group, numbering over 1,200, heard Dr. Arthur H. Compton, chancellor of Washington University in St. Louis, give an inspiring address on "Science Shapes the Future." At the regular dinner meeting of the Section, held on March 12, new officers were elected for the coming year. These are Lester J. Backman, president; Robert C. Vogt, vice-president; and Carl F. Renz, secretary-treasurer. Following dinner and the business meeting, the group adjourned to the Ohio River Division Laboratories of the U.S. Engineer Department. There R. R. Philippe, director of the laboratory, described the work being done and conducted the members on a tour of investigation. Present studies include work on experimental pavements for aircraft weighing 300,000 lb, and the showing of a colored film on the construction and testing of the pavement concluded the program.

### Cleveland Section

"Student Chapter Night" was celebrated on February 15, the program consisting of student reports of the Annual Meeting in New York. Prof. George E. Barnes, head of the civil engineering department at the Case School of Applied Science, explained that the reports were being substituted this year for the customary theses. He then introduced H. W. Merritt, president of the Case Student Chapter, who was in charge of the student program. At the meeting held on March 15, Lt. Col. C. Merrill Barber spoke on the topic, "Wartime Airport Design in Europe." Before entering the service in October 1942, Colonel Barber was on the civil engineering staff of the Case School.

### Colorado Section

Ways of making the Society more attractive to Juniors were discussed at the March meeting of the Colorado Section. It was the unanimous opinion of the group that Juniors should be given a full franchise and in other ways made to feel their usefulness to the Society. Another feature of the program was a talk by Walter E. Jessup, Western representative of the Society, who discussed the technical and welfare activities of the Society.

### Dayton Section

The March luncheon meeting of the Dayton Section was addressed by Lt. Col. Charles Stevens, who was recently released from the Army after over four years of service. Much of Colonel Stevens' time in Europe was spent as Civil Affairs Officer of the 101st Airborne Division, and he spoke interestingly of conditions in the various countries occupied by the Army.

### Florida Section

The proposed sea train and car ferry service to link the port of Jacksonville, Fla., with Brazil and Venezuela was discussed by Arthur N. Sollee at the March 7 dinner meeting of the Section. Mr. Sollee, who is county engineer of Duval County, Florida, stated that carloads of equipment, supplies, automobiles, and so on could be sent from Chicago, New York, or other industrial areas to Jacksonville, and then placed on a car ferry to continue the journey to Brazil or Venezuela at a huge saving in rehandling. He emphasized the engineering and economic feasibility of such a plan.

### Indiana Section

Various business matters were discussed at the March 25 dinner meeting of the Section. The group then heard Prof. Mildred Loring Fitch give an exceptionally interesting talk, entitled "Cross Currents in World Affairs."

### Intermountain Section

On March 15 Walter E. Jessup, Western representative of the Society, addressed a dinner meeting of the Section on the suggested new classification of members, collective bargaining, and other Society matters of interest to the Section. The technical program for the occasion consisted of a talk by E. O. Larson, director for Region 4 of the U.S. Bureau of Reclamation. Mr. Larson discussed future plans for the Colorado River Basin, dwelling particularly on the Central Utah Project.

### Ithaca Section

Both the February and March meetings were held on the Cornell University campus. The after-dinner speaker at the first of these sessions was Maj. Andrew J. Fuller, district engineer for the New York State Department of Health at Geneva, N.Y., who gave an interesting talk on sanitary conditions in the Near and Far East. Colonel Fuller based his remarks on personal observations made during three years in the Sanitary Corps of the Army. Speaker and guest of honor at the March meeting was Lt. Col. Robert N. Clark, who described the methods and results of "Army Training in Sanitation." Colonel Clark is district engineer for the New York State Department of Health at Ithaca.

### Kansas City Section

"Germany Today and Tomorrow" was the topic of discussion at the March 27 meeting of the Section, the principal speaker being Samuel J. Callahan, vice-president of the Section. Mr. Callahan based his interesting observations on the subject on experience gained while serving overseas as a Civil Affairs Officer for SHAEF.

### Los Angeles Section

Before a joint meeting, to which members of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers were invited, Col.

Frederick J. Clarke spoke on "The Atomic Development at Hanford." Colonel Clarke, who is area engineer and commanding officer at the Hanford Project, outlined the whole subject of atomic energy and described the development of the atomic bomb from the first promulgation of the theory of relativity by Dr. Einstein to the present. Some idea of the size of the Hanford project may be gained from the fact that it extends for an area of approximately 430 sq miles adjacent to the Columbia River. Of particular interest to the engineers were the physical aspects of the construction involved. Total earth excavation amounted to more than 25,000,000 cu yd, while the water-pumping facilities would more than take care of the normal requirements of New York City. Wide interest in the subject was attested by the attendance of over 250.

### LOUISIANA SECTION

A joint meeting of the Section and the Louisiana post of the Society of American Military Engineers was held on March 25. A special feature of the ocasion was the presentation of the Society's Construction Engineering Prize to C. Glenn Cappel for his paper on "Timber Hangar Erected from 16-Story Scaffold," which appeared in the December 1944 issue of CIVIL ENGINEERING. Customarily presentation of the Construction Engineering Prize takes place at the Annual Meeting in New York, but Mr. Cappel was unable to attend this year's meeting. An illustrated talk on "Repairing the Walcheren Dikes" comprised the technical program. This was given by Dr. M. J. W. Roegholt, of Utrecht, Holland, while Messrs. Frank C. Carey and John Klorer led the discussion that followed.

### MARYLAND SECTION

An illustrated lecture on "Origin and Destination Traffic Studies as a Basis for Street and Highway Planning" was presented by H. S. Fairbank at the March 25 meeting of the Section. The talk was of particular interest to Baltimoreans since a survey of this nature was recently completed locally and is one of thirty-nine that have been made in various cities. Mr. Fairbank emphasized the fact that an origin and destination survey is an essential means to the proper selection and location of routes within the city and, further, serves to provide a measure for the orderly improvement of such routes.

### MICHIGAN SECTION

On February 28, members of the Michigan Section heard the St. Lawrence Seaway discussed. First, F. N. Menefee, professor of engineering mechanics at the University of Michigan, described the engineering aspects of the project by means of lantern slides. He was followed by W. C. Cowling, manager of the Port of Detroit Commission, who discussed the economic aspects of the seaway. The showing of a film on water purification and sewage disposal comprised the technical program at the meeting held on April 2.

### MOHAWK-HUDSON SECTION

A joint meeting of the Hudson-Mohawk Section and the Albany County chapter of the New York State Society of Professional Engineers took place in Albany, N.Y., on February 18. The principal speaker was E. S. Cullings, chief engineer of the Black River Regulating District, whose subject was "Regulating the Black River and Its Tributaries by Storage Reservoirs." An enthusiastic general discussion followed his remarks.

### NEW MEXICO SECTION

The New Mexico Section reports that it was one of the groups sponsoring the tenth annual Highway Engineering Conference, which was held at the University of New Mexico on March 8 and 9. Speakers at the Friday morning session included Walter E. Jessup, Western representative of the Society, who discussed "Collective Bargaining for Engineers." William G. Bratschi, president of the New Mexico Section, presided over the Saturday afternoon technical session. Other Society members who participated in the program by presenting technical papers included Fred G. Healy, chief engineer of the New Mexico State Highway Department; Jesse E. Williams, district engineer for the Public Roads Administration at Santa Fe; A. J. Ryan, member of the Denver consulting firm of Crocker and Ryan; and F. S. Gilmore, district engineer for the Asphalt Institute at Kansas City, Mo.

### NORTHEASTERN SECTION

The technical program at the March meeting of the Northeastern Section—held in Boston on the 25th—consisted of a talk by Philip Kitfield. Mr. Kitfield, who is assistant project engineer for the Boston Department of Public Works and chairman of the Engineers' Committee of the Massachusetts Postwar Highway Commission, described in detail the studies of the commission and its recommendations for the Boston Central Artery.

### NORTHWESTERN SECTION

Numerous business matters were discussed at the April 1 meeting of the Section, which took place at the University of Minnesota. Then J. E. P. Darrell was introduced and gave an interesting description of construction and traffic problems encountered in building the Ledo Road during the war. Mr. Darrell is now assistant traffic engineer for the Minnesota Department of Highways.

### PHILADELPHIA SECTION

Following an annual custom, members of the Philadelphia Section laid aside their cares and technical concerns on February 16 and enjoyed a social meeting. Again Lyle Jenne proved himself an expert master of ceremonies, and there was an entertaining program of classical music, solo dancing, and juggling acts, followed by social dancing. During the evening Society Director Howard Critchlow presented certificates of life membership to those in the Section who had attained this honor. Other guests included Edwin Elliot, president of the Philadelphia Engineers' Club, and Allen Wagner, public relations officer of the Society.

### PITTSBURGH SECTION

There was a joint meeting of the Pittsburgh Section and the Engineers' Society of Western Pennsylvania on March 8. The joint session was addressed by W. E. Lorence, colonel, Corps of Engineers, U.S. Army, on the subject of "Flood Control for the Pittsburgh Region." Colonel Lorence is district engineer for the Pittsburgh district of the U.S. Engineer Office.

### ROCHESTER SECTION

The topic, "The Engineer in Court," was ably presented by James E. Cuff, Rochester attorney, before the March 20 meeting of the Rochester Section. The talk proved to be an interesting and instructive résumé of the engineer's duties as an expert witness.

### SACRAMENTO SECTION

On March 5, the Sacramento Section heard one of its own members, O. J. Porter, report on the use of heavy equipment to obtain maximum compaction and density in soils. Mr. Porter, who is senior physical testing engineer for the Materials and Research Department of the California State Division of Highways, described the use of heavy sheepsfoot rollers and rubber-tired equipment, particularly in airport construction. His talk was illustrated by slides. On March 12, the operation of the Pacific Gas and Electric Company's power system and its contribution to the war effort was described by I. W. Collins, assistant engineer of operations for the company. A discussion of electronic recording made up the program on March 26, with Richard Kobler, of the Ward Harris Company, as speaker.

### ST. LOUIS SECTION

The St. Louis Section announces that it has started a movement to bring the Society and the Section into closer relationship with their Junior and Student Chapter members. A new committee has been formed with H. M. Reitz, former president of the Student Chapter at Washington University and now a Junior affiliated with the St. Louis Section, as chairman. This committee will assist in preparing programs for some of the meetings, which will deal with subjects of particular interest to the young engineer.

### Tacoma Section

Guest of honor and speaker at the February 19 meeting of the Tacoma Section was W. D. Shannon, Society Director for District 12, who touched on many subjects of interest to Society members. W. J. Ryan concluded the program by presenting a colored motion picture depicting logging operations in the Northwest. On March 19 Roderic Olzendam, who is widely known for his views on labor-management relations, addressed a meeting on the subject of "Human Engineering." It is his theory that both sides of the employer-employee equation must be considered to perfect the most harmonious relationship.

### Tennessee Valley Section

Various aspects of the atomic bomb were considered at the February 13 meeting of the Knoxville Sub-Section. First, W. C. Youngs, Jr., captain, Corps of Engineers, U.S. Army, gave an illustrated description of the atomic bomb damage that he had witnessed at Nagasaki. He was followed by Dr. P. H. Abelson, who discussed the possible future effect of the atomic bomb on international relations and national security. Speakers at the March meeting of the Sub-Section were Wilbur R. Barrows and Walter F. Emmons, who gave an illustrated talk, entitled "Utah Beach to Buchenwald Camp."

On March 26, members of the Chattanooga Sub-Section heard James Hitching speak on the advantages to Chattanooga of having a city manager form of government.

### Toledo Section

The Toledo Section held its first meeting for 1946 on March 6. A talk on the proposed new Toledo Airport constituted the technical program. This was given by M. W. Cochrane, chief engineer of the Airport Division of Giffels and Vallet, of Detroit. Toledo has recently employed special engineers to make a study of airport sites, and Mr. Cochrane stated this study was the best of many that had been made in major cities. To eliminate a high fare for air transportation, he pointed out, the change in design of aircraft and equipment must be evolutionary rather than revolutionary in character.

### Tri-City Section

The speaker at the March meeting of the Tri-City Section—held in Davenport, Iowa, on the 28th—was A. L. R. Sanders, chief engineer for the Chicago consulting firm of Hazelet and Erdal. In his talk, entitled "Structural Design Problems," Mr. Sanders discussed a number of unusual problems that he has encountered in his 25-year career in bridge design.

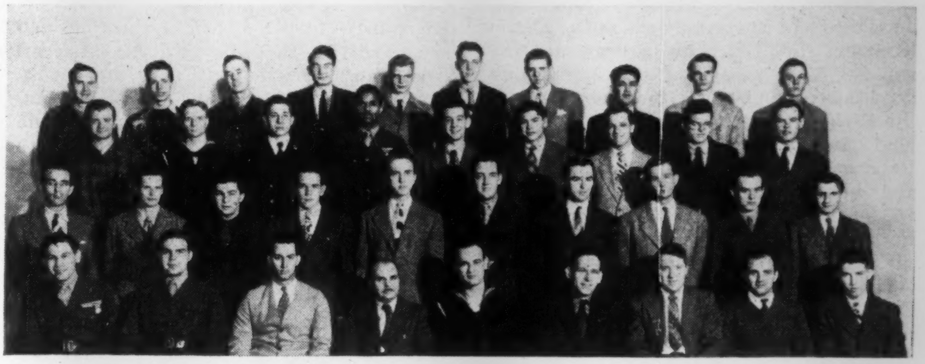
### Wisconsin Section

On February 28, members of the Wisconsin Section heard Harry C. Brockel, secretary of the Milwaukee Harbor Commission, speak on the timely topic of the St. Lawrence Seaway. It was Mr. Brockel's thesis that the project will benefit the entire Middle West as well as the Great Lakes area. The annual Ladies' Night was held on March 28, with door prizes for a lucky few of a pound of butter or a pair of nylons. The speaker and guest of honor was Elmer Nelson, curator of geology at the Milwaukee Public Museum, who gave an illustrated lecture, entitled "Sculptoring the Earth."

## Student Chapter Notes

### Purdue University

On February 12 Capt. Andrew G. Bisset, of the Bureau of Yards and Docks, addressed an open meeting of the Purdue University Student Chapter. Captain Bisset, who recently returned from an extended tour of duty in the South Pacific with the Seabees, presented two sound films showing the Seabees in action—one on the development of Wake Island and the other depicting the careening of a 21,000-ton floating dry dock upon its side to permit it to be taken through the Panama Canal. Preceding the meeting, the Chapter entertained Captain Bisset at a dinner. The meeting was one of several recently held to stimulate interest in the civil engineering profession among Purdue engineering students, and wide interest in the gathering was attested by the attendance of 500. The Chapter has launched a vigorous membership drive to obtain 100% membership.



Members of the Purdue University Student Chapter

### University of Idaho

The University of Idaho Chapter announces that it has had an interesting and active year, although membership in the group has been small. The Chapter's officers are Robert Olsen, president; P. J. McCormick, vice-president; and George Komoto, secretary-treasurer. The Faculty Adviser for the group is G. A. Riedesel, while William P. Hughes, city engineer of Lewiston, Idaho, is Contact Member. Members of the Chapter are shown in the accompanying photograph.

The University of Idaho Chapter

# ITEMS OF INTEREST

*About Engineers and Engineering*

## 1946 Flood Control Program Outlined

*Chief of Engineers, Lt. Gen. R. A. Wheeler, has described briefly the current program of navigation and flood control work assigned to the Corps of Engineers. Funds for the work are allotted in the 1946 Deficiency Bill (passed by Congress), the Civil Functions Appropriations Bill (now passed by the House), and in special appropriations for specific projects. This information was made public by General Wheeler at a recent meeting of the Associated General Contractors in Chicago.*

THE Deficiency Bill for the first half of 1946, passed by Congress in December, appropriated some $125,000,000 to the Corps of Engineers for flood control and navigation improvements. Out of the total of approximately $125,000,000 in the 1946 Deficiency Bill, $84,659,000 has been earmarked for general flood control projects. The funds provided for construction will be applied to 116 individual projects involving work in some 33 states. Fifty-three dams will be undertaken, of which 18 are concrete structures and 35 earth or rock fill. The remaining 63 projects are local protection works consisting mainly of levees and flood walls with some channel improvement.

The concrete dams will vary from simple flood control structures, such as the Dewey Reservoir in Kentucky costing approximately $2,600,000, to multiple-purpose flood control and power reservoirs, such as the Wolf Creek Reservoir on the Cumberland River in Kentucky and the Clark Hill Reservoir on the Savannah River in Georgia and South Carolina, estimated to cost $59,000,000 and $45,000,000, respectively. Earth dams will vary from small structures such as the $560,000 Mountain Brook Reservoir in New Hampshire to the Garrison Dam and Reservoir on the Missouri River in North Dakota, estimated to cost about $161,000,000. Similarly, local protection projects vary in size from the small $50,400 channel and levee improvement project at Almond, N.Y., to the project for the construction of levees and flood walls for the protection of the Kansas Citys in Missouri and Kansas at a cost of $18,445,000, or the channel improvement program for the Los Angeles River which eventually will cost about $53,959,400.

Another $15,000,000 of the Deficiency Bill appropriations will go for combined flood control and navigation improvement work on the lower Mississippi River. In addition to the approximately $85,000,000 for general flood control and $15,000,000 appropriated for the Mississippi River project in the 1946 Deficiency Bill, $25,516,000 has been appropriated for river and harbor projects. Among the larger projects for which this 25 million dollars will be spent are the continued improvement of the Los Angeles and Long Beach harbors in California; improvement and maintenance of the Mississippi River channel between St. Louis and Minneapolis; improvement of the Pearl River in Mississippi and Louisiana; additional navigation work on the Missouri River at Fort Peck; continued work on the Monongahela River in Pennsylvania and West Virginia; additional work on the Great Lakes-to-Hudson River Waterway; and improvement and maintenance of the Chesapeake and Delaware Canal.

### ADDITIONAL FUNDS

The Civil Functions Appropriations Bill for the fiscal year beginning July 1, 1946, has now passed the House with an additional $262,000,000 in round sums voted for rivers and harbors and flood control work under the supervision of the Corps of Engineers. Nearly $28,000,000 of this sum is earmarked for continuation of construction on a score of river and harbor projects, among them the New York and New Jersey channels, the Gulf Intracoastal Waterway, the Mississippi River between the mouth of the Ohio and the mouth of the Missouri, the Missouri from Kansas City to Sioux City, and the St. Marys River in Michigan. Advance planning funds for another score of river and harbor projects total $2,235,500, with routine maintenance and operation making up the approximately $68,000,000 remaining of the rivers and harbors allotment.

Of the $110,814,000 voted by the House for flood control (general), $96,150,000 is recommended for construction, providing for continuing work on 62 projects, most of which are already appropriated for in the 1946 Deficiency Bill. Nearly $8,000,000 in advance planning funds for flood control projects is also included in the bill passing the House, in addition to $46,000,000 for the Lower Mississippi flood control project, and $2,000,000 for the Sacramento River flood control project.

Like the flood control projects, the river and harbor improvements for which there are current appropriations are but a small part of the total backlog of authorized navigation projects already approved by Congress. The River and Harbor Act of March 1945 authorized 292 new navigation projects or modifications of existing projects at an estimated total cost of $382,000,000. These additional improvements include a 12-ft channel in the Intracoastal Waterway from Jacksonville to Miami, Fla.; improvement of the Apalachicola, Chattahoochee, and Flint rivers in Georgia and Florida; and development of the Alabama and Coosa rivers and tributaries in Alabama and Georgia.

### AUTHORIZED IMPROVEMENTS

The authorized navigation improvement of the Neches and Angelina rivers, Texas, provides for the construction of a reservoir on the Neches River, one on the Angelina River, and two power regulating dams on the Neches River. Other river and harbor projects include the Guadalupe River, Texas; improvement of the Trinity River and tributaries, Texas, for navigation, flood control, and allied purposes; construction of a lateral canal on the Mississippi River in the Chain of Rocks section near St. Louis, approximately 8 miles long and 9 ft deep; further improvement of the Illinois Waterway, Illinois, the Indiana Harbor Canal and Harbor, Indiana, and the Missouri River between Sioux City, Iowa, and the mouth; construction of a new hydroelectric power plant at St. Marys River, Michigan; construction of dams and open-channel improvement for the purpose of providing slack-water navigation on the Snake River, in Oregon, Washington, and Idaho; and construction of the McNary (Umatilla) Dam for purposes of navigation, power development, and irrigation on the Columbia River, Oregon, and Washington.

## Canal Zone Pension Bill

ATTENTION has been directed to the provisions of a bill passed in 1944 granting pensions to many employees who worked on the Panama Canal during the period of construction from May 4, 1904, to March 31, 1914. The Act thus mentioned by Arthur Richards, M. ASCE, is Public Law 319-78th Session, Chapter 214-2nd Session. Lifetime annuities are prescribed in the legislation.

Applications should be made to the Retirement Division of the U.S. Civil Service Commission at Washington, D.C.

## Ohio Court Order Protects Title of Engineer

*An injunction suit brought by the Ohio Society of Professional Engineers against the Cleveland firm of Designers for Industry, Inc., has been decided in favor of the former. The Cleveland Society of Engineers promoted the suit and at its request was given the authority to proceed in the name of the Ohio Society. The suit was filed in the name of William C. Kammerer, plaintiff, and Harvey R. Hawgood was counsel and adviser for the Society. The following article, written by Mr. Hawgood, is reprinted from "The Ohio Engineer" (March 1946), publication of the Ohio Society of Professional Engineers.*

THE DECREE comprises, in effect, two separate parts, one of which applies to the individual defendants, and the other to the corporation, Designers for Industry, Inc.

As to the individual defendants, these were all perpetually enjoined from calling themselves engineers.

The corporation was perpetually enjoined from permitting unregistered persons to do engineering work (except in the case of subprofessional work done under the supervision of a registered professional engineer), from calling anyone in its employ other than a registered professional engineer by any title implying that he is an engineer, and from advertising any registered professional engineer in its employ in any manner which would constitute misconduct.

This injunction should absolutely preclude the individual defendants from holding themselves out as engineers (unless they can and do qualify themselves by registration). Should any of them not become registered but continue to hold himself out as an engineer, he will be subject to action for contempt of court, which is punishable by fine or imprisonment (or both), at the discretion of the Court.

It should also insure that the company will undertake engineering work only when this work is done under the supervision of registered professional engineers, and should restrain its advertising to within such bounds as the Board of Registration may determine to be proper conduct for all engineers.

The decision, impliedly at least, holds the Registration Act valid, and certainly sustains our contention that injunction suits may be brought by individual members of the profession against non-registered persons who invade this field.

Thus the engineers have a weapon which they themselves can use to enforce the law to protect their profession, without having to wait on any public officer. This does not impair, however, the use of the criminal penalties by the prosecutor, should he desire to exercise his authority under this part of the law.

It is believed that this demonstration of the fact that the injunctive power of the courts can be invoked for the protection of the profession should go far toward obtaining the voluntary compliance with the law by those who otherwise might question the possibility of its enforcement.

## University of Texas Establishes Defense Research Laboratory

A NEW laboratory known as the Defense Research Laboratory has recently been established at the University of Texas. This is one of a series in universities and in industry operating under a Section T contract with the Bureau of Ordnance. Fundametal problems relating to guided missiles comprise the research goal. Major fields combined in the work are electronics, chemistry, optics, thermodynamics, acoustics, and mathematics.

Dr. C. P. Boner, Professor of Physics, who has been on leave of absence as Associate Director of the Underwater Sound Laboratory of Harvard University, is Director of the new laboratory. The Associate Director is Dr. M. J. Thompson, Professor of Aeronautical Engineering, who also has been on leave as Group Supervisor for Aerodynamics at the Applied Physics Laboratory, Johns Hopkins University. The staff numbers about 75, and includes Dr. Dana Young, M. ASCE, Professor of Applied Mechanics.

Two University buildings have been reconditioned and extended for laboratory purposes. Equipment has been supplied by the Bureau of Ordnance, largely from surplus stocks.

## Police Launch Traffic Safety Program

BEGINNING May 15 and continuing for an indefinite period, the police of the United States and Canada, under the sponsorship of the International Association of Chiefs of Police, will conduct their second program to reduce the staggering toll of motor-vehicle fatalities and injuries.

A year ago the IACP program was confined to the checking of automobile brakes. The program this year, to be known as the Police Traffic Safety Check, includes brakes and will extend to the checking of lights, tires, windshield wipers, and horns. IACP spokesmen state that these points for the police check were selected after conference with automotive safety engineers, and that accident hazards can be minimized if all these points are in proper condition.

Particular emphasis will be put on safe driving practices, and motorists will be advised to improve their driving techniques, and to observe all driving regulations and courtesies. On the theory that the safest car is a lethal weapon in the hands of an incompetent or careless driver, the police look for a material reduction in traffic accidents when all drivers have been convinced that they must always operate their cars with the greatest caution.

Motor-vehicle fatalities and injuries mounted alarmingly in the months immediately following the end of gasoline rationing. In 1945 there were 28,500 fatalities and approximately 1,000,000 injuries from automobile accidents. Fatalities were 17% higher than in 1944. But evidence that both cars and driving practices are unsafe is found in the fact that monthly fatality figures in the last five months of 1945 rose to as high as 44% above corresponding periods in the previous year. During the final five months the fatality increase was about 36% over the same period in 1944.

It can be assumed that 1946 figures will mount correspondingly unless the public comes to the realization that aging cars are increasingly subject to accidents, which can be forestalled only when the closest care is given to mechanical condition. The police program has the active support of more than 200 national organizations and corporations that are interested in the furtherance of highway traffic safety.

## The Builders

*By* DR. VANNEVAR BUSH

ACKNOWLEDGED as a leader in atomic and all other forms of technical outreach, Dr. Vannevar Bush is also recognized as an outstanding engineering thinker of the day. Some of his philosophic ideas have now been published under the title, *Endless Horizons.* The following sermonette or parable taken from this book gives a good idea of Dr. Bush's keen mind and appealing style.

"The process by which the boundaries of knowledge are advanced, and the structure of organized science is built, is a complex process indeed. It corresponds fairly well with the exploitation of a difficult quarry for its building materials and the fitting of these into an edifice; but there are very significant differences. First, the material itself is exceedingly varied, hidden and overlaid with relatively worthless rubble, and the process of uncovering new facts and relationships has some of the attributes of prospecting and exploration rather than of mining or quarrying. Second, the whole effort is highly unorganized. There are no direct orders from architect or quarry-master. Individuals and small bands proceed about their businesses unimpeded and uncontrolled, digging where they will, working over their material, and tucking it into place in the edifice.

"Finally, the edifice itself has a remarkable property, for its form is predestined by the laws of logic and the nature of human reasoning. It is almost as though it had once existed, and its building blocks had then been scattered, hidden, and buried, each with its unique form retained so that it would fit only in its own peculiar position, and with the concomitant limitation that the blocks cannot be found or recognized until the building of the structure has progressed to the point where their position and form reveal themselves to the discerning eye of the talented worker in the quarry. Parts of the edifice are being used while construction proceeds, by reason of the applications of science, but other parts are merely admired for their beauty and symmetry, and their possible utility is not in question.

"In these circumstances it is not at all strange that the workers sometimes proceed in erratic ways. There are those who are quite content, given a few tools, to dig away unearthing odd blocks, piling them up in the view of fellow workers, and apparently not caring whether they fit anywhere or not. Unfortunately there are also those who watch carefully until some industrious group digs out a particularly ornamental block; whereupon they fit it in place with much gusto, and bow to the crowd. Some groups do not dig at all, but spend all their time arguing as to the exact arrangement of a cornice or an abutment. Some spend all their days trying to pull down a block or two that a rival has put in place. Some, indeed, neither dig nor argue, but go along with the crowd, scratch here and there, and enjoy the scenery. Some sit by and give advice and some just sit.

"On the other hand there are those men of rare vision who can grasp well in advance just the block that is needed for rapid advance on a section of the edifice to be possible, who can tell by some subtle sense where it will be found, and who have an uncanny skill in cleaning away dross and bringing it surely into the light. These are the master workmen. For each of them there can well be many of lesser stature who chip and delve, industriously, but with little grasp of what it is all about, and who nevertheless make the great steps possible.

"There are those who can give the structure meaning, who can trace its evolution from early times, and describe the glories that are to be, in ways that inspire those who work and those who enjoy. They bring the inspiration that not all is mere building of monotonous walls, and that there is architecture even though the architect is not seen to guide and order.

"There are those who labor to make the utility of the structure real, to cause it to give shelter to the multitude that they may be better protected, and that they may derive health and well-being because of its presence.

"And the edifice is not built by the quarrymen and the masons alone. There are those who bring them food during their labors, and cooling drink when the days are warm, who sing to them, and place flowers on the little walls that have grown with the years.

"There are also the old men, whose days of vigorous building are done, whose eyes are too dim to see the details of the arch or the needed form of its keystone, but who have built a wall here and there, and lived long in the edifice; who have learned to love it and who have even grasped a suggestion of its ultimate meaning; and who sit in the shade and encourage the young men."

This article, which forms the last chapter in Dr. Bush's book, was adapted from an address, "Science for World Service," before the New York Herald-Tribune Forum on Current Problems, October 31, 1945.

Copies of the 180-page book, *Endless Horizons*, are available in cloth at $2.50 each from the American Council on Public Affairs, 2153 Florida Avenue, Washington 8, D.C.

## Surplus Property to Public Health Agencies

INSTRUCTIONS to eligible public health claimants for purchasing surplus property at a 40% discount were made available recently by the U.S. Public Health Service. The Federal Security Agency, through the U.S. Public Health Service, a constituent unit, serves in an advisory capacity to the War Assets Corporation in the distribution of surplus property to eligible public health claimants. The new instructions replace an interim procedure which expired February 16.

A 40% discount from "fair value," will be granted eligible public health claimants under Regulation 14 issued by the former Surplus Property Administration. "Fair value" is defined as the lowest price prevailing at any trade level at the time of transaction.

Included among eligible claimant groups are state, county, and local official public health agencies, such as health and sanitation departments, water works, sewerage systems, garbage and disposal plants.

Hospitals operated by non-federal governmental agencies, non-profit hospitals, clinics and public health research organizations; schools of nursing, medicine, dentistry, public health, and pharmacy; and certain miscellaneous non-profit groups organized primarily to promote the public health also are entitled to the discount.

The bulk of goods offered for sale to public health claimants is "consumer goods" and "capital goods." Consumer goods comprise a wide range of products normally handled in everyday retail trade. They include such things as clothing, textiles, lunchroom equipment, furniture, office equipment, automobiles, trucks, tires, hardware, surgical and medical equipment, vocational training equipment, agricultural and construction machinery, farm supplies and tools, photographic equipment and the like.

Capital goods include such items as industrial plant equipment, raw materials other than food, partly finished materials, aircraft machinery, machine tools, electronics, metals, ores, fibers, chemicals, oil and coal products, transportation equipment.

Copies of the instructions may be obtained from the Office of Surplus Property Utilization, U.S. Public Health Service, Railroad Retirement Building, Washington 25, D.C., and from the USPHS representative in the War Assets Corporation regional consumer goods office.

## N. G. Neare's Column

*Conducted by*

R. ROBINSON ROWE, M. ASCE

"I'VE been worried for two months," said the Professor, "lest some chamber of commerce in Vermont protest my offhand remark that some farms up there seem to grow an annual crop of cobbles. My only critic claims that the crop is lushest near the center of the fields, with distribution far from uniform, and that Ike N. Hall will lose on his contract.

"Well, I'm still betting on Ike; he knows his way around. The question was not whether he lost his shirt, but what was his average haul in clearing the 20-acre triangular field."

"Easy for me," bragged Joe Kerr. "I was born in Vermont and I used to work for Ike. My answer is $^2/_3$ furlong."

"Out of the mouths of babes!" jeered Cal Klater. "This is the toughest assignment in six years and the answer isn't any simple $^2/_3$. Using Joe's furlongs and spotting the pile of cobbles a distance $a$ from the right angle, then the average haul $h$ can be expressed:

$$h = {}^1/_2 \int_0^2 dx \int_0^{2-x} \sqrt{(x-a)^2 + y^2}\, dy$$

"The solution requires solving the integra for $h$ in terms of $a$, then differentiating and setting $dh/da = 0$ to find $a$, then substituting this value of $a$ back in the integral. You see, it makes quite a difference where Ike puts the pile. If $a = 0$, then $h = 1.082$; if $a = 2$, $h = 1.530$; if $a = 1$, $h = 0.892$.

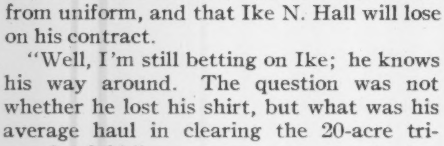


FIG. 1. HALL USED EUCLIDEAN HAUL

"Frankly, I couldn't solve for $a$ except by cut and try; my answer for $a = {}^2/_3$ was $h =$ 0.852 furlong. Maybe Joe scaled $a$ instead of $h$ from his graph."

"Probably not," said Professor Neare, "because Joe is exactly right. Tell Cal where you figured Ike piled the cobbles, Joe."

"Ike knew his way around, Professor. You specified 'a single pile on one of the two legs of the boundary' so Ike made the single pile the whole length of the leg. He didn't need calculus to tell him that the shortest distance from a point to a line was the perpendicular. Besides, he knew that cobble fences are the regular thing in Vermont."

"Just so, Joe. And Cal, you were close on the tougher interpretation. Actually, $a = 0.702$ and $h = 0.8515$ and it is a real problem.

"Our new problem is an old problem with new dimensions. Two or three times each year it shows up in my mail in some form or other, but usually with the question, 'What's the easiest way to work this old chestnut?' So the assignment is not only to get the answer, but to economize on aimless effort.

"A level street is flanked by vertical walls, against which rest crossed ladders with their feet at bases of opposite walls. One ladder is 35 ft long, the other 30 ft 4 in., and their intersection is 7 ft 6 in. from the pavement. How wide is the street?"

[*This month the Cal Klaters remain anonymous. The latest request for the new problem came from Walter E. Suter, giving the dimensions 50, 40, and 10, respectively, which have been reduced to make it easier.*]

## Sanitary Conference Opens in Rio De Janeiro June 10

THE Pan American Sanitary Bureau, in cooperation with the Institute of Inter-American Affairs, is planning the first regional conference on sanitary engineering in Latin America, to be held in Rio de Janeiro, Brazil, the week of June 10, 1946. Objectives are to:

1. Advance the profession of sanitary engineering
2. Exchange scientific data and ideas in the development of sanitary engineering in the Americas
3. Promote the development of standards for sanitation in regard to international travel
4. Accelerate the development of sanitation in the Americas to aid in economic development
5. Create a better understanding between the engineers of the American republics
6. Organize a permanent Pan American organization of sanitary engineers.

The Department of Health of the Ministry of Health and Education of Brazil will act as host, and sessions will meet in the Ministry of Health and Education Building. Registration will take place on Monday, June 10, and sessions will formally open at 11 a.m.

All sanitary engineers; civil engineers engaged in sanitary, water supply, or hydraulic projects; public health administrators; federal, state, or municipal sanitary engineers; engineering educators and engineering students are cordially invited to participate. Information and hotel reservations may be secured directly from Mr. Edmund G. Wagner, Institute of Inter-American Affairs, Avenida Rio Branco 251, Caixa Postal 1530, Rio de Janeiro, Brazil.

## New in Education~

### *Yale Fellowships in Traffic Engineering*

Ten Graduate Fellowships in Traffic Engineering are announced by the Bureau of Highway Traffic of Yale University. These amount to $1,400 each and provide for a full academic year of graduate study beginning September 23, 1946. They have been made possible through a grant from the Automotive Safety Foundation.

Theodore M. Matson, Director of the Yale Bureau of Highway Traffic, in announcing the fellowships stated: "There is an increasing need for professional traffic engineers in highway traffic work, in view of the acute street and highway transportation problems which now exist in nearly every community and which show every promise of growing worse before relief can be obtained."

Fellowship awards are open to men who have been granted an engineering degree by an accredited college—also to qualified veterans under the G. I. Bill of Rights. As in former years, it is expected that there will also be students from city or state highway departments, some through special assignment by their employers. The closing date for applications is June 1. For details address the Bureau of Highway Traffic, Yale University, New Haven 11, Conn.

## NEWS OF ENGINEERS

### *Personal Items About Society Members*

**Brehon B. Somervell**, general, U.S. Army (retired), has accepted the position of president of Koppers Company, Inc., of Pittsburgh, Pa. General Somervell is widely known for his wartime service as commander of the Army Service Forces. He is an Honorary Member of the Society.

**John C. Gearhart** and **Henry L. Thompson** have been admitted to the Portland (Ore.) consulting firm of Stevens and Koon. Mr. Gearhart was associated with the firm from 1936 until he entered the U.S. Navy during the war, while Mr. Thompson was formerly on the civil engineering staff of Northwestern Technological Institute.

**J. A. Clulo**, of Norway, Mich., has accepted the position of superintendent of public works and city engineer for the city of Marquette, Mich. Mr. Clulo served with the Seabees in the Pacific Theater of War, and was recently discharged from the Navy, with the rank of lieutenant commander.

**Thomas J. Rodhouse** has joined the engineering staff of the Iowa Steel and Iron Works at Cedar Rapids, Iowa, after more than thirteen years with the Corps of Engineers in a civilian engineering capacity. For the past ten years he has been stationed in the Rock Island (Ill.) District, where he worked on the 9-ft channel project on the Upper Mississippi River, and later carried out assignments on war construction and the production of military supplies.

**H. E. Drumwright** is now sanitary engineer for the city of Dallas, Tex. He has just finished serving with the U.S. Naval Reserve, in which he was a lieutenant (jg).

**Oscar Hoffman**, formerly associate professor of structural engineering at Fenn College, has accepted the position of associate professor of civil engineering at the Case School of Applied Science. Another member of the Society appointed to the staff of the Case School is **John B. Scalzi**, previously an engineer for the Curtiss-Wright Corporation at Buffalo, N.Y., who will be assistant professor of structural engineering.

**L. R. Ferguson** has retired as vice-president and manager of the Texas division of the Lone Star Cement Corporation after a number of years with that organization. However, he will continue to live in Dallas and to serve the company in an advisory capacity.

**Benjamin S. Sheinwald** announces that he is reopening his offices at 85 South Street, Boston, Mass., where he will have a general engineering and architectural practice. He has terminated his connection with the building construction section of the National Advisory Committee for Aeronautics at Langley Field, Va.

**Harry Otis Wright, Jr.**, has returned to civilian life from the Marine Corps, where he served as airport engineer on the staff of the Assistant Commandant, and accepted the position of chief engineer for Public Airport Services, Inc., in Washington, D.C.

**Paul A. E. Flux** has resumed his connection with the design division of the Connecticut State Highway Department at Hartford, Conn., after five years' service in the Civil Engineer Corps of the U.S. Navy, in which he had the rank of captain. His last assignment was that of officer-in-command of the Seabees' Advance Base Depot at Davisville, R.I.

**Ezra C. Wenger** will head the Conservation Bureau that has just been established by the Portland Cement Association to correlate technical information and assist users of concrete in the various engineering fields. For the past eleven years Mr. Wenger has been regional highway engineer for the Association in six states, with headquarters in Chicago.

**William S. Little**, until lately a lieutenant colonel in the Corps of Engineers, U.S. Army, has become chief engineer for W. N. Brown, Inc., of Washington, D.C., a firm specializing in topographic, geodetic, and photogrammetic surveys. Formerly assigned to the Engineer Board at Fort Belvoir, Va., where he served as chief of the Surveying Section, Colonel Little was recently awarded the Legion of Merit for his work on the development of surveying equipment and desert navigation methods.

**Hans R. Jacobsen**, principal engineer for the Reconstruction Finance Corporation, Office of Defense Plants, has been transferred from Detroit, Mich., to Brooklyn, N.Y., where he will take over the division comprising Long Island, Brooklyn, and certain parts of Connecticut.

**Ek Khoo Tan**, previously research associate at Princeton University, is now on the permanent secretariat of the Provisional International Civil Aviation Organization, with headquarters in Montreal, Canada.

**Bruce P. Barber** announces that he has been discharged from the Sanitary Corps of the U.S. Army, in which he served for over two years as a captain, and has gone back to his old position with the Tomlinson Engineering Company, of Columbia, S.C. He is in charge of municipal engineering for the organization.

**Ralph F. Rhodes** has been promoted from the position of principal engineer in the U.S. Engineer Office to that of head engineer. Mr. Rhodes has been in the Savannah (Ga.) office of the U.S. Engineer Department since 1921, when he was detailed to duty there to undertake a study looking to the improvement of Savannah harbor.

**Morris M. Cohn**, editor of *Sewage Works Engineering* and sanitary engineer for the city of Schenectady, N.Y., has been appointed adviser-at-large to the state of Vermont in the field of stream-pollution abatement.

**Karl Terzaghi** is the 1946 recipient of the Frank P. Brown Medal of the Franklin Institute, Philadelphia, Pa. Dr. Terzaghi, who is a consulting engineer and lecturer on soil mechanics in the Graduate School of Engineering at Harvard University, received the award "in consideration of his theoretical and technical knowledge, initiative, pioneering research, and outstanding leadership in the establishment of the science of soil mechanics." Presentation of the award was made at the annual Medal Day ceremonies in Philadelphia on April 17.

**Milton F. Wagnitz**, lieutenant colonel, Corps of Engineers, U.S. Army, has returned to his position as engineer of public structures in the Detroit (Mich.) City Engineer's Office after three years overseas.

**Harold B. Gotaas**, president of the Institute of Inter-American Affairs, recently received the Legion of Merit with the citation for outstanding services in the operation of the cooperative health and sanitation and strategic materials development programs in the Latin-American republics.

**Arthur V. Dienhart**, ensign, Civil Engineer Corps, U.S. Naval Reserve, is now engaged in the construction and maintenance of Navy public works on Saipan. Prior to entering the service in March 1945, he was employed on plant construction and maintenance for the Dravo Corporation, in Pittsburgh.

**John S. Kennoy** announces that he has established his own firm for the practice of civil engineering at Lexington, Ky. He will specialize in the construction and maintenance of airports. Mr. Kennoy was recently released from duty as a captain in the

Corps of Engineers, U.S. Army, where he served as assistant staff engineer at the headquarters of the Eastern Technical Training Command, St. Louis, Mo.

Leo Shadic, plant engineer at the MacIntyre Development of the National Lead Company since the beginning of production operations in 1942, has returned to his former private practice of engineering and land surveying. He will be located in Philmont, N.Y.

Glenn R. Stevens has been named director of the Construction and Supply Service of the Veterans Administration branch office at Columbus, Ohio. Mr. Stevens, who has been in the Utilities Division of the Administration for the past fourteen years, will supervise the construction and operation of facilities and the furnishing of supplies for all Veterans Administration activities in Ohio, Michigan, and Kentucky.

Abel Wolman, consulting engineer and professor of sanitary engineering at the Johns Hopkins University, has been made director of the newly established Sanitation Research Project of the Association of American Railroads, which has been set up to provide increased health protection to railway passengers and employees.

Clarence E. Boesch, head engineer of the North Atlantic Division of the U.S. Engineer Department, is a recent recipient of the Legion of Merit for his wartime service as assistant to the Division Engineer of the North Atlantic Division, in which capacity he was "largely responsible for both the engineering and construction of foreign bases of major importance to the war in Europe and the defense of our shores. . . ."

Joseph W. Barker has resigned as dean of the school of engineering at Columbia University in order to accept the position of president of the Research Corporation, with headquarters in New York. The Corporation is a leading foundation for the support of scientific investigation in educational and scientific laboratories throughout the country. Dr. Barker will be succeeded by James K. Finch, professor of civil engineering and since 1941 associate dean of the faculty of engineering. Dean Finch received the Columbia Alumni Medal in 1932 and, at commencement in 1942, the gold medal of the class of 1889 for service "to his university, students, and profession."

George A. Rahn, Jr., and Alfred W. Johnson are now on the staff of the National Research Council—the former in the capacity of engineer of materials, and Mr. Johnson as engineer of soils and foundations. Until lately Mr. Rahn was with the Pennsylvania State Department of Highways, while Mr. Johnson was formerly field engineer with the Highways and Municipal Bureau of the Portland Cement Association.

Percy M. Feltham was recently appointed director of construction and supply services for the Southern area of the Veterans Administration, with headquarters in Atlanta, Ga. He was previously supervising superintendent of construction for the area.

Raphael G. Kazmann has severed his connection as hydrologic engineer for the U.S. Geological Survey at Memphis, Tenn., in order to accept a position in a similar capacity with Ronney Method Water Supplies, Inc., of Louisville, Ky.

Henry L. Doten, who has just been discharged from the Corps of Engineers, U.S. Army, with the rank of major, will return to the University of Maine in the capacity of business manager.

Harvey J. Johnson, B. L. Trawicky, and Dennis J. McMahon have returned to the U.S. Engineer Office at St. Paul, Minn., after overseas service in various branches of the U.S. Army.

Langford T. Alden, formerly consulting engineer to the shore division of the Bureau of Ships, U.S. Navy, has accepted the position of chief engineer with the Tidewater Construction Corporation, of Norfolk, Va.

George B. Sowers, lieutenant colonel, Corps of Engineers, U.S. Army, has returned to the practice of civil engineering in the capacity of chief engineer and general manager of the Drilled-In Caisson Corporation, after three years' service in the military government section of the Army. Prior to entering the Army, Colonel Sowers maintained a consulting civil engineering practice in Cleveland, Ohio, specializing in foundation and harbor work.

J. Lester Brown, previously construction engineer for the Mittry Brothers Construction Company, of Los Angeles, Calif., has become project engineer for the Peter Kiewet Sons' Company.

Truman P. Young is now associated with Hunter W. Hanly in a civil and structural engineering practice at Cincinnati, Ohio, which will have the firm name of Hanly and Young. Mr. Young was recently released after service as a major in the U.S. Army Air Corps.

Roy F. Warner, until lately a lieutenant colonel in the Corps of Engineers, U.S. Army, has taken a position as hydraulic engineer in the U.S. Engineer Office at St. Paul, Minn.

Elbert J. Taylor, formerly resident engineer in Philadelphia for the Pittsburgh consulting firm of Morris Knowles, Inc., has been appointed chief of the Philadelphia Bureau of Water.

Frederick A. Reickert has resumed his connection as design engineer for Hazelet and Erdal, of Chicago, Ill., after serving as a lieutenant colonel in the Corps of Engineers, U.S. Army.

Lewis B. Combs, rear admiral, Civil Engineer Corps, U.S. Navy, has been made director of the Atlantic Division of the Bureau of Yards and Docks, with headquarters in New York. He will be succeeded in his previous capacity as assistant chief of the Bureau by Rear Admiral Joseph F. Jelley, Jr., who has been on duty in the Pacific.

Franklin T. Matthias has accepted a position as manager of a hydroelectric project for the São Paulo Tramway Light and Power Company, Ltd., in Brazil. Until lately Mr. Matthias was a colonel in the U.S. Army in charge of the Hanford (Wash.) atomic bomb materials plant.

Horace S. Kerr, now on terminal leave from the Corps of Engineers, U.S. Army, in which he held the rank of major, has accepted a position with the H. B. Zachry Construction Company, with headquarters in San Antonio, Tex.

Frank D. Rideout is now contract manager for the Osborn Engineering Company, of Cleveland, Ohio. He was previously contract manager for the American Bridge Company in Cleveland.

Eugene Y. Allen has retired as chief engineer of the Reading Company, with headquarters in Philadelphia, after serving with that organization since 1914. He will be succeeded by Edward L. Gosnell, former chief engineer of the Baltimore and Ohio Railroad.

B. P. Greenwade was recently named city engineer of Brenham, Tex. He was formerly superintendent of the construction department for Norgaard Shawetal at Hitchcock, Tex.

J. R. Hendrick, who was just released from the Corps of Engineers, U.S. Army, with the rank of major, has accepted a position as designing engineer in the water department of the City of Fort Worth. Lt. Bert D. Barber, of the U.S. Navy, is another member of the Society who has joined the staff of the City of Fort Worth—in the building inspection department.

John L. Savage, who is on loan to the State Department as a specialist under its Cultural Cooperation Program, has gone to Palestine, where he will appear before the Anglo-American Commission and outline technical plans for the development of water resources in the country. In May 1945 Mr. Savage retired as chief designing engineer for the U.S. Bureau of Reclamation after thirty-four years of service.

Frank F. Bell has resumed his connection as vice-president of the Uvalde Construction Company at Dallas, Tex., after several years as a colonel in the Corps of Engineers, U.S. Army.

George N. Carter has been made manager of the newly established Central Snake River District of the U.S. Bureau of Reclamation, with headquarters in Boise, Idaho. Mr. Carter was formerly senior engineer for the Bureau at Boise.

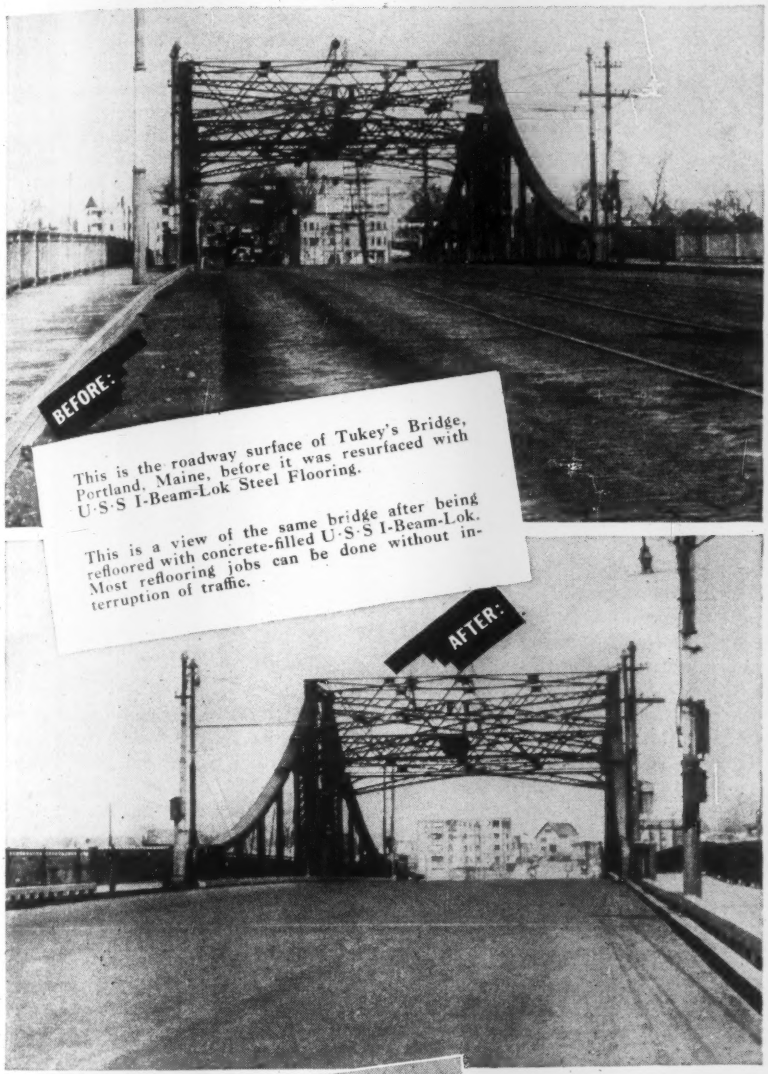
Frederick C. Schlemmer and Ross M. Riegel, who are on the staff of the Tennessee Valley Authority, are en route to India, where they will advise the Indian government on the Damodar Valley project.

Carl D. Matthias has been relieved from active duty as a captain in the Corps of Engineers, and has returned to work in the Norfolk Engineer District as hydraulic engineer in the Flood Control Branch. For the past two and a half years Mr. Matthias has been at a U.S. Army base near Cairo, Egypt, where he worked on the maintenance and supply of U.S. Army installations.

Hugo G. Erickson is now assistant city engineer of Minneapolis, Minn. He was recently released from the U.S. Army Air Corps, in which he had the rank of major.

Horatio S. Mattimore, until lately senior civil engineer for the Bureau of Yards and Docks of the U.S. Navy, has established a consulting practice at Colonial Park, Pa., where he will specialize in concrete construction and paving.

# Give your old bridges... *a New Lease on Life!*



This is the roadway surface of Tukey's Bridge, Portland, Maine, before it was resurfaced with U·S·S I-Beam-Lok Steel Flooring.

This is a view of the same bridge after being refloored with concrete-filled U·S·S I-Beam-Lok. Most reflooring jobs can be done without interruption of traffic.

## U·S·S I-BEAM-LOK STEEL FLOORING

*increases liveload capacity with minor changes in structure*

Many bridges are bottlenecks in our highway improvement program. Yet, thousands of them can be made fit for the mounting burden of traffic ahead with U·S·S I-Beam-Lok Steel Flooring.

The ease and speed with which I-Beam-Lok can be installed . . . the smooth-riding, fireproof, safe, skid-resisting and long-life surface it produces — its demonstrated economy — have earned this lightweight, heavy-duty, high-efficiency floor construction acceptance by the nation's leading bridge and highway engineers.

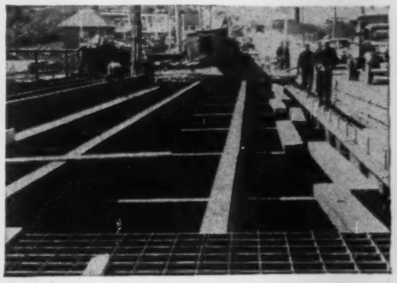
In the reflooring of existing bridges, its light weight and great strength often make it possible to increase H-load ratings without major changes in existing bridge structures.

U·S·S I-Beam-Lok is available in both concrete-filled and open types. The concrete-filled I-Beam-Lok is available in 3″ and 4½″ sizes and in weights of only 47 and 55 lbs. per sq. ft. I-Beam-Lok Open Flooring is even lighter. Applied directly on stringer spacings up to 4 ft. centers for H-20 loading, it weighs only 18.6 lbs. per sq. ft.

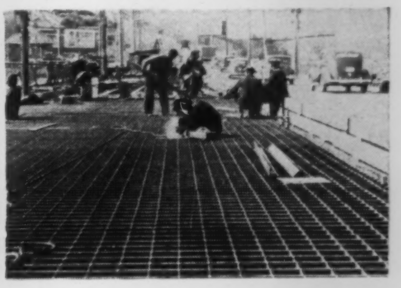
To find out more about I-Beam-Lok, the modern floor for modern traffic, contact the office nearest you. Our engineers will gladly discuss its possibilities with you.

*Other U·S·S Engineering Products for Highway and Bridge Projects*

- ★ **Sheet Steel Piling**
- ★ **H-Beam Bearing Piles**
- ★ **Multigrip Floor Plate**
- ★ **Concrete Reinforcing Bars**
- ★ **Corrugated Metal Pipe**



Here you see the placing of new stringers preparatory to the laying of the I-Beam-Lok Flooring. In many instances, however, I-Beam-Lok can go down on existing stringers, depending on their condition.



This shows the erection of the new flooring. Heavy equipment can be driven onto bridge just as soon as I-Beam-Lok is put in place. Concrete can be delivered to job and dumped just where needed.

USS STEEL UNITED STATES STEEL

**CARNEGIE-ILLINOIS STEEL CORPORATION**
*Pittsburgh and Chicago*
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

**UNITED STATES STEEL**

## DECEASED

George William Bailey (M. '44) of Millburn, N.J., died on March 8, 1946, at the age of 58. Mr. Bailey had been superintendent of general construction for the Levering and Garrigues Company, of New York (1915 to 1922), and construction manager for the New York City Housing Corporation. More recently he was with Daniel O'Connells Son, Inc., of Holyoke, Mass., and general manager of the Caspar Ranger Construction Company, also of Holyoke. During the recent war he was project manager for the Wigton Abbott Corporation on the construction of the U.S. Naval Supply Depot at Bayonne, N.J., and the Naval aircraft delivery unit at Trenton, N.J. Since December 1943 he had been with the Raymond Concrete Pile Company in Rio de Janeiro, Brazil.

Leslie J. Bennett (Affiliate '02) retired engineer of Buffalo, N.Y., died recently. Mr. Bennett spent practically his entire career with the Buffalo Cement Company, with which he was connected for many years. He was, successively, secretary, vice-president, and president. He retired in 1940.

Arthur Maximillien Bouillon (M. '14) chief field engineer for Alexander D. Crosett, of New York, N.Y., died on March 4, 1946. Mr. Bouillon was with the Canadian National Railways from 1906 to 1919, in charge of the construction of steel bridges and other structures. He then established a private practice in Seattle, and later was engaged on preliminary planning and construction of the Chicago Terminal Improvement for the Illinois Central Railroad. From 1927 to 1929 he was principal engineer assistant on railway projects in Persia, and later was with the Federal Works Agency. Mr. Bouillon was the author of numerous articles on winter construction, concrete, and foundations.

Robert Wright Boyd (M. '22) former chief engineer for the Turner Construction Company, of New York, died at his home in Scarsdale, N.Y., on March 22, 1946. His age was 66. During the first World War Mr. Boyd headed the concrete ship section of the U.S. Shipping Board. From the end of the war until 1934 he was chief engineer for the Turner Company, and from 1934 to 1937 he was New York City director of the New York State Temporary Emergency Relief Administration. In the latter year he was appointed director of the State Employment Service. At the outset of the second World War Mr. Boyd rejoined the Turner Company and was put in charge of the construction of war plants in various parts of the country. He retired because of illness several months ago.

Henry Rogers Codwise (M. '22) professor emeritus of railroad engineering and surveying at the Polytechnic Institute of Brooklyn, Brooklyn, N.Y., died at his home in that city on March 8, 1946. In a few days he would have been 69. Professor Codwise had been on the Brooklyn Polytechnic staff for forty-seven years, which made him the faculty member with the longest tenure in the history of the institution. From 1928 to 1930 he was associate professor of railroad engineering and surveying, and from 1930 until his retirement in March of last year he held the rank of full professor.

Benjamin LeFevre Coulson (Assoc. M. '08) of Lakeland, Fla., died on February 24, 1946, at the age of 75. Mr. Coulson spent his early career in railroad work, having been in charge of terminal construction for the Louisville and Nashville Railroad. He then (1908 to 1914) became professor of engineering at the University of the South at Sewanee, Tenn., and later was field engineer and valuation engineer for the Interstate Commerce Commission. From 1921 to 1923 he was city engineer of Sidney, Ohio, and from the latter year to 1930 he maintained a private practice in Cincinnati, Ohio.

Henry Dievendorf Dewell (M. '17) consulting civil engineer of San Francisco, Calif., died in Berkeley, Calif., on March 20, 1946. Mr. Dewell, who was 65, was a former Director and Vice-President of the Society. A biographical sketch and photograph appear in the "Society Affairs" section of this issue.

David Ferguson (Assoc. M. '23) civil engineer in the Office of the Chief of Engineers, Fortification Section, Washington, D.C., died in a hospital in that city on December 9, 1945. During the first World War Mr. Ferguson served overseas with the 319th Field Artillery, and from 1919 to 1923 was connected with the Mississippi River Commission at Memphis, Tenn. During the period from 1924 to 1930 he was with the Ingalls Iron Works, the Tennessee Iron and Coal Company, and the Richmond (Va.) Structural Steel Company; and from 1930 to 1940 he was with the structural section of the Procurement Division of the Treasury Department. He had been connected with the War Department since 1941.

Philip Brockett Hill (M. '18) civil engineer for the Tennessee Valley Authority at Chattanooga, Tenn., died on March 23, 1946, at the age of 68. From 1906 to 1923 Mr. Hill was a member of the Little Rock (Ark.) consulting engineering firm of Lund and Hill; from 1923 to 1926, engineer for the Continental Rock Asphalt Company of Leitchfield, Ky.; and from 1927 to 1933 he was in private practice in Florence, Ala. Since 1934 he had been connected with the Tennessee Valley Authority—for several years as civil engineer at Wilson Dam, Ala. He was transferred to Chattanooga, Tenn., in 1942.

Frederick William Honens (M. '04) retired engineer of Sterling, Ill., died on March 7, 1946. Mr. Honens, who was 74, was for many years manager of the Sterling Foundry Company. Earlier in his career he had been with the U.S. Engineer office on the construction of the Illinois and Mississippi Canal and the Missouri River project in the Kansas City area. At the time of his retirement in 1941, Mr. Honens was assistant superintendent of the Sterling Sewer System.

John Rogers Hudson (M. '87) of St. Louis, Mo., died on January 3, 1946. He was 89 years old, and ninth on the list of the Society's veteran members, having been a corporate member for fifty-nine years. Mr. Hudson had conducted surveys for railway location in California and municipal surveys in San Francisco, and at one time was with the Corps of Engineers, U.S. Army, on river surveys. He retired because of illness a number of years ago.

William Ellis Row Irwin (Assoc. M. '29) assistant manager of the Ethyl Corporation plant at Baton Rouge, La., was fatally stricken at the plant on March 25, 1946. Mr. Irwin, who was 49, had been with Gibbs and Hill on railway electrification and construction projects, and from 1928 to 1934 was field engineer for Day and Zimmermann, of Philadelphia, on the construction of the Eastern State Penitentiary at Gratersford, Pa. Later he was for several years construction superintendent for E. I. du Pont de Nemours and Company at Wilmington, Del. During the war he worked on the construction of the Ethyl Corporation's plant at Baton Rouge and was assistant manager at the time of his death.

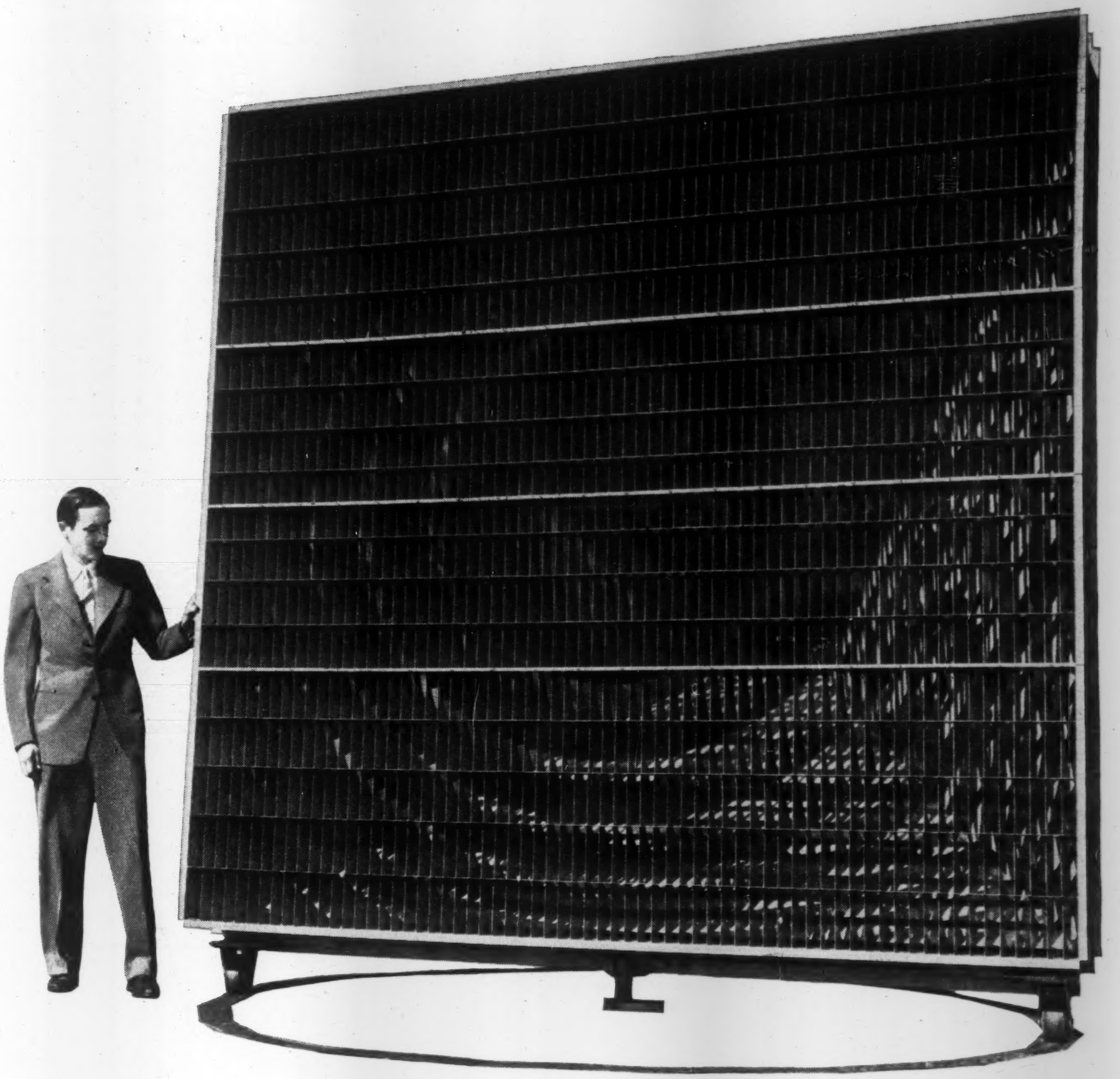
Marion Reed Kays (M. '27) construction engineer for the Federal Housing Authority at Atlanta, Ga., died in a hospital there on March 13, 1946, at the age of 65. At one time Mr. Kays was vice-president and general manager of the Idaho Irrigation Company, Ltd., at Richfield, Idaho. Later (1930 to 1940) he was superintendent and chief engineer for the Lake Worth Drainage District at West Palm Beach, Fla., and from 1940 to 1943 he was with the West Palm Beach Housing Authority. In the latter year he went to Atlanta to take a position with the Federal Housing Authority.

George Richard Kurrie (M. '23) retired engineer of Philadelphia, Pa., died on February 24, 1946, at the age of 78. Early in his career Mr. Kurrie was with the Shiffler Bridge Company and the Pottsville (Pa.) Iron and Steel Company. From 1897 to 1912 he maintained a private contracting practice in Philadelphia, and from 1917 to 1920 he was in charge of the construction division of the Bureau of Yards and Docks in Washington, D.C. He then returned to Philadelphia, where he established an engineering practice, retiring in 1932.

Marcus Winfield Lewis (M. '07) retired consulting engineer in the Office of the Chief of Engineers, U.S. Army, died at his home in Hyattsville, Md., on March 2, 1946. Mr. Lewis, who was 84, spent his early career as civil engineer for the city governments of Duluth, Minn., and Superior, Wis. In 1910 he went to Washington, D.C., in the capacity of consulting engineer on rivers and harbors for the U.S. War Department. He retired in 1932.

Ralph Steck McCormick (M. '11) retired engineer of Sault Ste. Marie, Ontario, Canada, died suddenly on March 18, 1946, in New York City, where he was visiting. He was 72. Mr. McCormick became connected with the Algoma Central and Hudson Bay Railway Company in 1901 and, except for six years (1903 to 1909) with other lines, he remained there until his retirement in June 1945. At the time of his retirement he was chief engineer and general superintendent.

James Everett Mackie (Assoc. M. '30) Western manager of the National Lumber Manufacturers' Association, San Francisco, Calif., was killed in an automobile accident near that city on February 21, 1946. Mr. Mackie, who was 47, had been connected with the National Lumber Manufacturers'



A "SEARCHLIGHT" TO FOCUS RADIO WAVES

In the new microwave radio relay system between New York and Boston, which Bell Laboratories are developing for the Bell System, giant lenses will shape and aim the wave energy as a searchlight aims a light beam.

This unique lens—an array of metal plates—receives divergent waves through a waveguide in the rear. As they pass between the metal plates their direction of motion is bent inward so that the energy travels out as a nearly parallel beam. At the next relay point a similar combination of lens and waveguide, working in reverse, funnels the energy back into a repeater for amplification and retransmission.

A product of fundamental research on waveguides, metallic lenses were first developed by the Laboratories during the war to produce precise radio beams.

This "searchlight" is a milestone in many months of inquiry through the realms of physics, mathematics and electronics. But how to focus waves is only one of many problems that Bell Telephone Laboratories are working on to speed microwave transmission. The goal of this and all Bell Laboratories research is the same—to keep on making American telephone service better and better.

**BELL TELEPHONE LABORATORIES**

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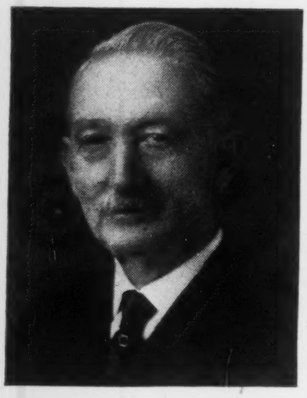
Association since 1930. Earlier in his career he was with the Wisconsin State Highway Commission, and from 1927 to 1929 he was secretary of the Pacific Coast Building Officials Conference—in charge of work on the uniform building code. During the first World War he served overseas with the A.E.F.

**Francesco Mauro** (M. '23) consulting engineer of Corona, N.Y., died on February 26, 1946, at the age of 78. A native of Italy, Mr. Mauro received his technical education in this country. Later (1910 to 1918) he was reinforced concrete engineer for the Truscon Steel Company in Youngstown (Ohio), Detroit, and Paris, and during the first World War he was with the American Red Cross in Italy. After the war he became structural engineer for Martin J. Lide on construction projects in Montgomery and Birmingham, Ala., and at one time he was in private practice in Birmingham. In recent years he was senior designer in the New York City Park Department.

**Andrew Miedwig** (M. '35) industrial engineer for United Engineers and Constructors, Inc., of Philadelphia, Pa., died suddenly on March 14, 1946. His age was 57. From 1918 to 1921 Mr. Miedwig was structural designer in the Construction Division of the U.S. War Department; from 1921 to 1922, chief engineer for the Stang and Mitchell Construction Company, of Philadelphia; and from 1922 to 1927, structural engineer for the Philadelphia firm of Day and Zimmermann, Inc. From 1927 to 1935, and again from 1937 until his death he was supervising engineer for United Engineers and Constructors, Inc. During his tenure with the latter organization he was in charge of the design of many industrial projects.

**Edward Gray Taber** (M. '14) pioneer railroad builder and former Director of the Society, died in Spokane, Wash., on February 19, 1946. Mr. Taber, who was 90, spent his entire career in railroad construction in the Northwest. Following his graduation from Massachusetts Institute of Technology in 1877, he became assistant engineer for the Northern Pacific Railway on the location and construction of its main and branch lines. He remained there until 1888, and then became resident engineer on the Seattle, Lake Shore and Eastern Railway. Later he was locating engineer for the Union Pacific; resident engineer for the Great Northern Railway on the construction of its main line; and principal assistant engineer on the Spokane Falls and Northern Railway. From 1905 until his retirement in 1934 he was chief engineer for the Spokane International Railway. Long active in the Society, Mr. Taber served a term as Director from 1926 to 1928.



Edward G. Taber, 1855–1946
Former Director of Society

**William Prentiss Morse** (M. '09) retired civil engineer of Newton, Mass., died at East Bridgewater, Mass., on February 21, 1946. He was 82. Prior to his retirement in 1935, Mr. Morse had been connected with the engineering department of Newton for fifty-four years—for much of this period in the capacity of city engineer.

**Clarence Sydney Timanus** (M. '30) consulting engineer of Kansas City, Mo., died at his home there on March 12, 1946, at the age of 53. Mr. Timanus had been with the Burns and McDonnell Engineering Company since his discharge from the U.S. Navy in 1918. He became a partner and member of the firm in 1930. Among the many projects over which he had personal direction was the enlargement of the water filtration plant at Cincinnati, Ohio, and the design of the lake water supply, purification plant, and municipal power plant at Springfield, Ill. In 1942 and 1943 he was architect-engineer on the construction of the Smoky Hill Air-base at Salina, Kans., one of the bases for the training of B-29 fliers.

**William Albie Van Duzer** (M. '22) director of motor vehicles and traffic for the District of Columbia, Washington, D.C., died in that city on February 23, 1946. Mr. Van Duzer, who was 64, spent his early career with the New York Central Railroad. In 1912 he became connected with the Pennsylvania State Highway Department, serving successively as assistant engineer at Scranton, assistant maintenance engineer at Harrisburg, and deputy engineer executive at Harrisburg. He had been director of vehicles and traffic since 1934. In 1930, while president of the American Road Builders' Association, he was appointed United States representative on the permanent commission of the International Association of Road Congresses.

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# Changes in Membership Grades

## *Additions, Transfers, Reinstatements, and Resignations*

From March 10 to April 9, 1946, Inclusive

### Additions to Membership

**Burgess, Turner P.** (Jun. '45), Associate Engr., Phillips Petroleum Co., Bartlesville, Okla. (Res., 1520 Crescent Road, Lawrence, Kans.)

**Burkman, Eugene Elden** (Jun. '45), Ensign, CEC, U.S.N.R.; Public Works Dept., Naval Hospital, Great Lakes, Ill.

**Cataldo, John Albert** (Jun. '46), Ensign, U.S.-N.R., *U.S.S. Montpelier CL 57*, Care, Fleet Post Office, New York, N.Y.

**Chamberlain, Theodore Lee** (Jun. '45), Ensign, CEC, U.S.N.; Olivia, Minn.

**Charlton, Frank Gregory, Jr.** (Jun. '45), Jun. Engr., Autauga County Eng. Dept., Prattville (Res., Autaugaville), Ala.

**Coleman, George Whitney** (Jun. '46), Ensign, U.S.N., Public Works Dept., Naval Air Station, Patuxent, Md.

**Davison, Aldace Henry** (M. '46), Civ. Engr., (Senior Engr., Head, Estimate Section), U.S. Engr. Dept., 819 Industrial Trust Bldg. (Res., 74 Savoy St.), Providence 6, R.I.

**Dionne, Maurice Joseph** (Assoc. M. '46), Constr. Engr., Compagnie Aramayo de Mines en Bolivie, Casilla 674, La Paz, Bolivia, S.A.

**Dumas, Stanley Oliver** (Jun. '45), Ensign, U.S.N.; Route 2, Box 571, Longview, Wash.

**Evans, John Turle** (M. '46), Engr. and Gen Mgr., Trent Navigation Co., Wilford St., Nottingham, England.

**Fellman, Morton** (Jun. '45), Private, U.S.Army, 78th Army Air Force Base Unit, Langley Field, Va.

**Fox, Charles Henry** (Jun. '46), Engr. Designer, Consolidated Steel Corp., Maywood, Calif.

**Fuqua, Lawrence Franklin** (Assoc. M. '46), Pres., South End Bldg. Materials Co., Box 6628, Houston, Tex.

**Goddard, Charles Rutherford** (Assoc. M. '46), Purchasing Agt. Project Mgr., White Constr. Co., Inc., 95 Madison Ave., New York, N.Y. (Res., 228 Maple Ave., Rahway, N.J.)

**Gourley, Rex Ramon** (Jun. '46), Ensign, CEC, U.S.N.R.; 5416 Dale Ave., Rockford, Ill.

**Heffernan, James Aloysius** (Jun. '45), Design Draftsman, M. W. Kellogg Co., 225 Broadway, New York (Res., 42–51 Two Hundred Forty-seventh St., Little Neck), N.Y.

**Holley, Frederick Charles** (Assoc. M. '46), Sales, Engr., Armco Venezolana, Apartado 368, Caracas, D.F., Venezuela.

**Hudson, Richard Iles** (Jun. '45), Ensign, CEC, U.S.N.R.; Public Works Dept., V-58, Naval Air Station, Norfolk, Va.

**Hutchinson, Alexander Paul** (Jun. '46), Draftsman, Alexander Hutchinson, 608 South Ave. (Res., 758 Penn Ave.), Pittsburgh 21, Pa.

**Jackson, Clive Tanner** (Jun. '45), Ensign, U.S.N.; 1055 East Santa Anita, Burbank, Calif.

**Jackson, J. Ceylon** (M. '46), Associate Engr. (Civ.), Dist. 10, State Dept. of Public Works, Babylon, N.Y.

**Jaehnig, Gordon Henry** (Jun. '45), Junior Asst. Engr. (R), U.S. Public Health Service, Delta Medical Center (Res., 409 Grand Ave.), Greenwood, Miss.

**Katz, Irwin Charles** (Jun. '46), Maj., U.S.Army; 1617 Ohlman Ave., Cleveland, Ohio.

**Klett, William Caesar** (Assoc. M. '46), Civ. Engr., Humble Oil & Refining Co., Room 817 Humble Bldg., Houston (Res., 801 North Craig, Victoria), Tex.

**Kollmar, Robert Bernard** (Jun. '46), Ensign, U.S.N.R.; 128 Fort Washington Ave., New York 32, N.Y.

**Konstant, Anthony Nicholas** (Jun. '46), 5923 North Paulina St., Chicago 26, Ill.

**Koo, Tsu-Yuan** (M. '45), Director, Bureau of San. Eng., Tientsin Municipal Govt., Tientsin, China.

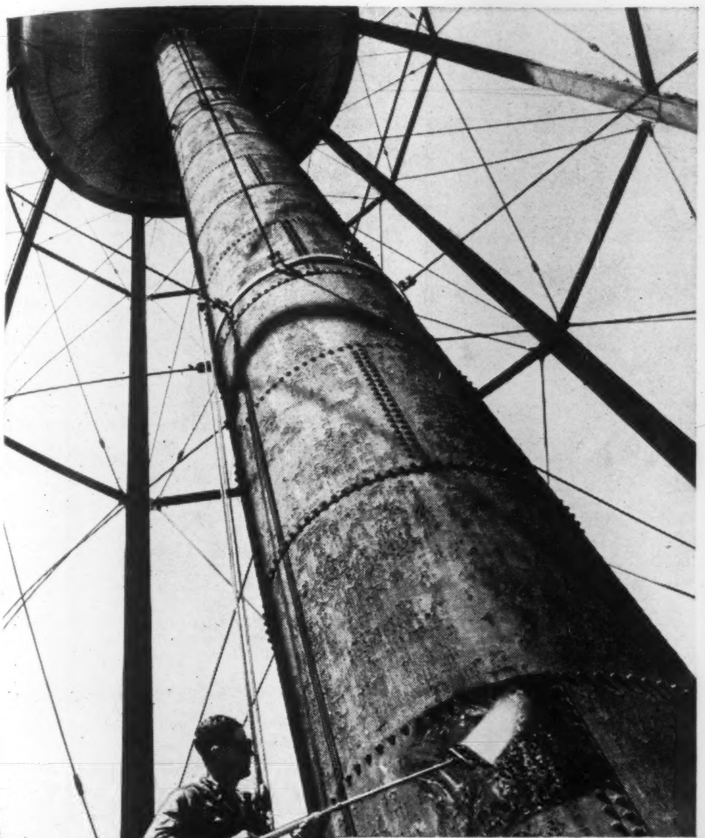
**Manrique, Hector** (Assoc. M. '46), Asst. Mgr., Christiani and Nielsen, Box 1188 (Res., Box 1115), Caracas, Venezuela.

**Matrejek, Edmund Walter** (Jun. '46), Graduate Asst. Teacher, Illinois Inst. of Technology (Res., 5315 Drexel Ave.), Chicago, Ill.

**McCall, Charles Cunliffe** (Assoc. M. '46), City Mgr., City of Salinas, City Hall (Res., 219 Acacia St.), Salinas, Calif.

**Nally, Richard Eugene** (Jun. '46), Office Engr., New York, New Haven & Hartford R.R., Room 3840 Grand Central Terminal, New York (Res., 775 Macon St., Brooklyn 33), N.Y.

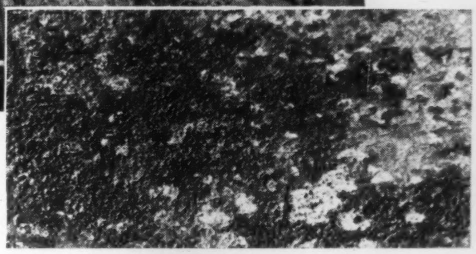
**Needham, Clyde Alden** (Jun. '46), Asst. Industrial



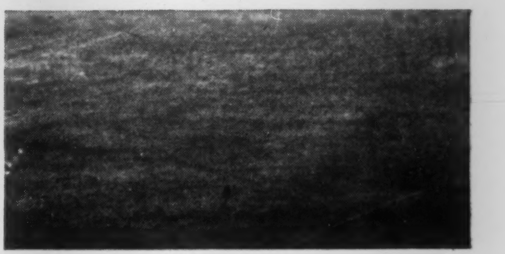
Start of flame-cleaning operation on water tower structure

It's Flame Cleaning

the fast, economical method for Preparing Steel for Painting



**BEFORE** — *Close-up view shows conditions of paint-lift heavy rust and scale that were met.*



**AFTER** — *The finished job after flame cleaning. A smooth, clean, dry surface ready for a lasting coat of paint.*

Quickly, easily and safely applied, the Airco flame cleaning process provides a clean, warm and dry surface conducive to a lasting paint job. The oxyacetylene flame cockles old paint, loosens rust and drives off hidden moisture . . . gives longer paint life to all kinds of steel structures.

In planning new steel structures exposed to weather, prepare before you paint for economical maintenance. Flame clean all steel parts before applying the prime coat of protection. This method loosens the semi-tenacious mill scale. No dirt or moisture left to start corrosion. Reduces future maintenance costs to absolute minimum and gives longer life to the paint job.

For further details write for folder ADG-1066B—"Flame Cleaning and Dehydrating Old Steel Structures," and folder ADG-1067A—"Flame Cleaning and Dehydrating New Steel Structures." Address: Air Reduction, General Offices: 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

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Engr., Frederic R. Harris Eng. Corp., 224 Daylight Bldg., Knoxville, Tenn.

NUTTER, JOHN MURRAY (Jun. '45), Ensign, U.S.N.; Box 171, Outwood, Ky.

OAKES, DEAN EDSON (Jun. '45), Eng. Trainee, Goodyear Tire & Rubber Co. (Res., 877-378 Eller Ave.), Akron 6, Ohio.

PARKS, WALTER JOHN, JR. (Assoc. M. '46), San. Engr., Reynolds, Smith & Hills, Cons. Engrs., Box 4817, Jacksonville 1, Fla.

PATON, WILLIAM (Assoc. M. '46), Sales Engr., Armco Drainage & Metal Products, Inc., Middletown, Ohio (Res., 2625 North 12th St., Terre Haute, Ind.)

PENZIEN, JOSEPH (Jun. '45), Instr., Gen. Eng., Univ. of Washington, 311 Edu. Hall, University of Washington, Seattle, Wash.

PERCIVAL, MURRAY ANDREW (Jun. '45), Ensign, CEC, U.S.N.R.; 255 Center St., Baldwin Park, Calif.

PERSON, WAYNE HIRAM (Jun. '46), Insp. of Eng., Park Comm., City of San Francisco, Park Lodge, Golden Gate Park (Res., 106 Third Ave.), San Francisco, Calif.

PISTER, KARL STARK (Jun. '45), Ensign, CEC, U.S.N.R.; Route 4, Box 815, Stockton, Calif.

POYER, WALTER THOMAS, JR. (Jun. '45), 1151 Jeannette Ave., Des Plaines, Ill.

PRESTON, DONALD LEON (Jun. '45), Private, U.S. Army, Company C, 27th RT Battalion, ASFTC, Fort Leonard Wood, Mo.

REEVE, WILLIAM ALEXANDER (M. '46), Senior Engr., Bridge Div., John A. Roebling's Sons Co., Trenton 2, N.J.

ROSEN, MAURICE LEO (Assoc. M. '46), Chf. Engr. and Sales Mgr., Flexo Wire Co., 70 West 1st St., Oswego, N.Y.

SIRKEL, FERDINAND ALEX (Jun. '45), Ensign, CEC, U.S.N.R., Public Works Officer, Public Works Dept., Naval Auxiliary Air Station, Rodd Field, Corpus Christi, Tex.

SNYDER, DONALD CLINTON (Jun. '45), Ensign, CEC U.S.N.R.; 522 Monte Vista Ave., Azusa, Calif.

STEIN, MYER (M. '46), Senior Engr., U.S. Corps of Engrs., 270 Broadway (Res., 1 Seaman Ave.), New York 34, N.Y.

STINSON, EUGENE THORNTON (Jun. '45), Ensign, U.S.N.R., *U.S.S. General W. F. Hase, AP-146*, Care, Fleet Post Office, San Francisco, Calif.

SWENSON, SIDNEY ALLEN (Jun. '45), Eng. Aide II, State Div. of Water Resources & Eng., 8 State Office Bldg. (Res., 796 Osceola Ave.), St. Paul 5, Minn.

WAGGONER, NORMAN EDWARD (Jun. '45), Ensign, CEC, U.S.N.R.; 7117 South East Brooklyn St., Portland, Ore.

WHITESELL, DOLPHUS EMANUEL (Assoc. M. '45), Chf. of Surveys, City of Houston, 409 City Hall, Houston, Tex.

WINGERT, ALBERT LEROY (Jun. '45), Surveyor and Computer, National Geophysical Co., Inc., Schulenburg, Tex. (Res., Route 1, Columbia, La.)

YOUNG, THAYNE HARWOOD (Jun. '45), Ensign, CEC, U.S.N.R., Public Works ABD, Port Hueneme, Calif.

### TOTAL MEMBERSHIP AS OF APRIL 9, 1946

| | |
|---|---|
| Members | 6,369 |
| Associate Members | 8,187 |
| Corporate Members | 14,556 |
| Honorary Members | 36 |
| Juniors | 6,610 |
| Affiliates | 77 |
| Fellows | 1 |
| Total | 21,280 |
| (April 9, 1945 | 20,670) |

### MEMBERSHIP TRANSFERS

ANDERSEN, PAUL (Jun. '25; Assoc. M. '29; M. '46), Prof., Structural Eng., Civ. Eng. Dept., Univ. of Minnesota, Minneapolis 14, Minn.

ANDRUS, LYNN THORPE (Assoc. M. '34; M. '46), Cons. Engr., 328 1/2 Main St., Ames, Iowa.

BLOSS, ERWIN ERNST (Assoc. M. '30; M. '46), (Horner & Shifrin, Cons. Engrs.), 803 Shell Bldg. (Res., 6538 Walsh St.), St. Louis, Mo.

CORBETT, DON MELVIN (Assoc. M. '30; M. '46), Dist. Engr., Water Resources Branch, U.S. Geological Survey, 445 North Pennsylvania St. (Res., 3419 North Pennsylvania St., Apt. C-6), Indianapolis 5, Ind.

DOWNS, JOHN AUSTIN (Jun. '38; Assoc. M. '46), Asst. Div. Engr., Great Lakes Dredge & Dock Co., 1100 Morgan Bldg., Buffalo, N.Y.

GARVIN, DANIEL FORD (Jun. '43; Assoc. M. '46), Structural Design-Research Asst., Ebasco Services, Inc., Room 705, 2 Rector St., New York (Res., 122 Fisher Ave., Apt. E-3, White Plains), N.Y.

KOCAL, STANLEY JOHN (Jun. '42; Assoc. M. '45), Designing Engr., City of San Jose, City Hall (Res. 1544 Hanchett Ave.), San Jose 11, Calif.

MAINS, ROBERT MARVIN (Jun. '38; Assoc. M. '46), Engr., Applied Physics Laboratory, Johns Hopkins Univ., 8621 Georgia Ave., Silver Spring, Md.

MATTHEWS, JOHN THOMPSON (Jun. '41; Assoc. M. '46), Field Engr., Peerless Pump Div., Food Machinery Corp., 2205 Twenty-first Ave., South, Birmingham 5, Ala.

NELSON, FRED BURGESS (Assoc. M. '09; M. '46), Civ. Engr., Dept. of Water Supply, Gas and Electricity, Municipal Bldg., Chambers St. (Res., 16 Fort Charles Pl.), New York 63, N.Y.

REECE, KEMP WILSON (Assoc. M. '38; M. '46), Eng. Mgr., Ebasco Services, Inc., 2 Rector St., New York 6, N.Y.

REED, REX RAYMOND (Jun. '36; Assoc. M. '46), Field Representative, U.S. Bureau of Reclamation, South Interior Bldg., Washington, D.C. (Res., 9628 Brunett Ave., Silver Spring, Md.)

RHODES, FORREST LEROY (Jun. '40; Assoc. M. '46), (Engr., Civ. P 4), Director, Upper Columbia Snow Laboratory, War Dept., U.S. Engrs., Box 563, Glacier Park, Mont.

ROMIG, WILLIAM DAVIS (Jun. '36; Assoc. M. '46), Engr., U.S. Bureau of Reclamation, Washington 25, D.C.

SANDSTEDT, CARL EDWARD (Jun. '13; Assoc. M. '18; M. '46), Prof., Civ. Eng., Acting Head, Civ. Eng. Dept., Agri. and Mech. College of Texas, College Station, Tex.

SCHOLER, WALTER, JR. (Jun. '37; Assoc. M. '46), Archt. (Walter Scholer and Associates), 114 State St., Lafayette, Ind.

SCHROEPFER, GEORGE JOHN (Jun. '30; Assoc. M. '36; M. '46), Prof., San. Eng., Univ. of Minnesota, 123 Main Eng. Bldg., Univ. of Minn., Minneapolis, Minn.

STEINER, RICHARD LEWIS (Jun. '36; Assoc. M. '46), Director, Baltimore Redevelopment Comm., 407-A Municipal Bldg. (Res., 1512 Bolton St.), Baltimore 17, Md.

TUETING, WILLIAM FRANCIS, JR. (Jun. '40; Assoc. M. '45), with U.S. Engr. Office, Omaha, Nebr. (Res., 218 West Kerr, Centralia, Ill.)

TWISS, FRANCIS ERNEST (Jun. '34; Assoc. M. '46), 550 Main St. (Res., 33 Keney Terrace), Hartford 5, Conn.

VAN KLEECK, LEROY WINFIELD (Jun. '27; Assoc. M. '37; M. '46), Prin. San. Engr., State Dept. of Health, State Office Bldg. (Res., 67 High Farms Road West), Hartford 7, Conn.

WESTON, ROY FRANCIS (Jun. '39; Assoc. M. '46), San Engr., The Atlantic Refining Co., 3144 Passyunk Ave., Philadelphia 45, Pa.

### REINSTATEMENTS

AEGERTER, WILLIAM CARL, Assoc. M., reinstated Jan. 1, 1946.

ANDREWS, CHARLES MORRISON, Assoc. M., reinstated Jan. 1, 1946.

BOLMER, MAURICE THEODORET, Assoc. M., reinstated Mar. 4, 1946.

DUPUY, ALBERTO, M., reinstated Jan. 1, 1946.

GASTMEYER, ROBERT WILLIAM, Assoc. M., reinstated Jan. 1, 1946.

GUNWALDSEN, RALPH WERNER, Jun., reinstated Mar. 8, 1946.

HAYNES, GEORGE ALBERT, M., reinstated Jan. 1, 1946.

HENDEE, MYRON, Assoc. M., reinstated Jan. 1, 1946.

MERSHON, EDWARD JAMES, Assoc. M., reinstated Mar. 8, 1946.

O'CONNOR, THOMAS JOSEPH, Assoc. M., reinstated Jan. 1, 1946.

ORR, JOSEPH ANDERSON, Assoc. M., reinstated Jan. 1, 1946.

RAMAGE, HARRY LAWRENCE, M., reinstated Jan. 1, 1946.

RIBBEN, THORBURN REES, Jun., reinstated Jan. 1, 1946.

SLATER, JAMES PRICE, Assoc. M., reinstated Jan. 1, 1946.

VAUGHT, GEORGE WILLITS, Jun., reinstated Jan. 1, 1946.

### RESIGNATIONS

BURRELL, GENE NATHANIEL, M., resigned Jan. 23, 1946.

CALLIGARO, LEO, Jun., resigned Mar. 25, 1946.

DILLON, LEE SOMMERVILLE, M., resigned Mar. 7, 1946.

GLÜCKERT, WILLIAM JOHN, JR., Assoc. M., resigned Mar. 25, 1946.

GRIMES, MAURICE WASON, M., resigned Mar. 25, 1946.

HALL, GEORGE WALTER, Jun., resigned Mar. 6, 1946.

HARDENBERGH, DONALD EDWARD, Jun., resigned Mar. 6, 1946.

INMAN, CHARLES HORACE, JR., Jun., resigned Mar. 15, 1946.

JANVIER, GEORGE, JR., Jun., resigned Mar. 25, 1946.

KEENAN, HOWARD UNDERHILL, Jun., resigned Mar. 7, 1946.

LEONARD, JAMES IRVING, M., resigned Dec. 31, 1945.

LIGHT, WILLIAM CRAIG, Jun., resigned Mar. 7, 1946.

MARKHAM, EDWARD MURPHY, M., resigned March 25, 1946.

NIESS, RICHARD CHARLES, Jun., resigned Mar. 19, 1946.

SNELL, RICHARD DIMMICK, Jun., resigned Mar. 7, 1946.

STEWART, DOUGLAS MACMILLAN, Jun., resigned Mar. 7, 1946.

THOMPSON, WILLIAM JEFFERSON, Jun., resigned Feb. 21, 1946.

VOGT, JOHN EDWARD, Jun., resigned Mar. 25, 1946.

## Change of Address

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SECRETARY, ASCE, 33 W. 39th St., New York 18, N. Y.

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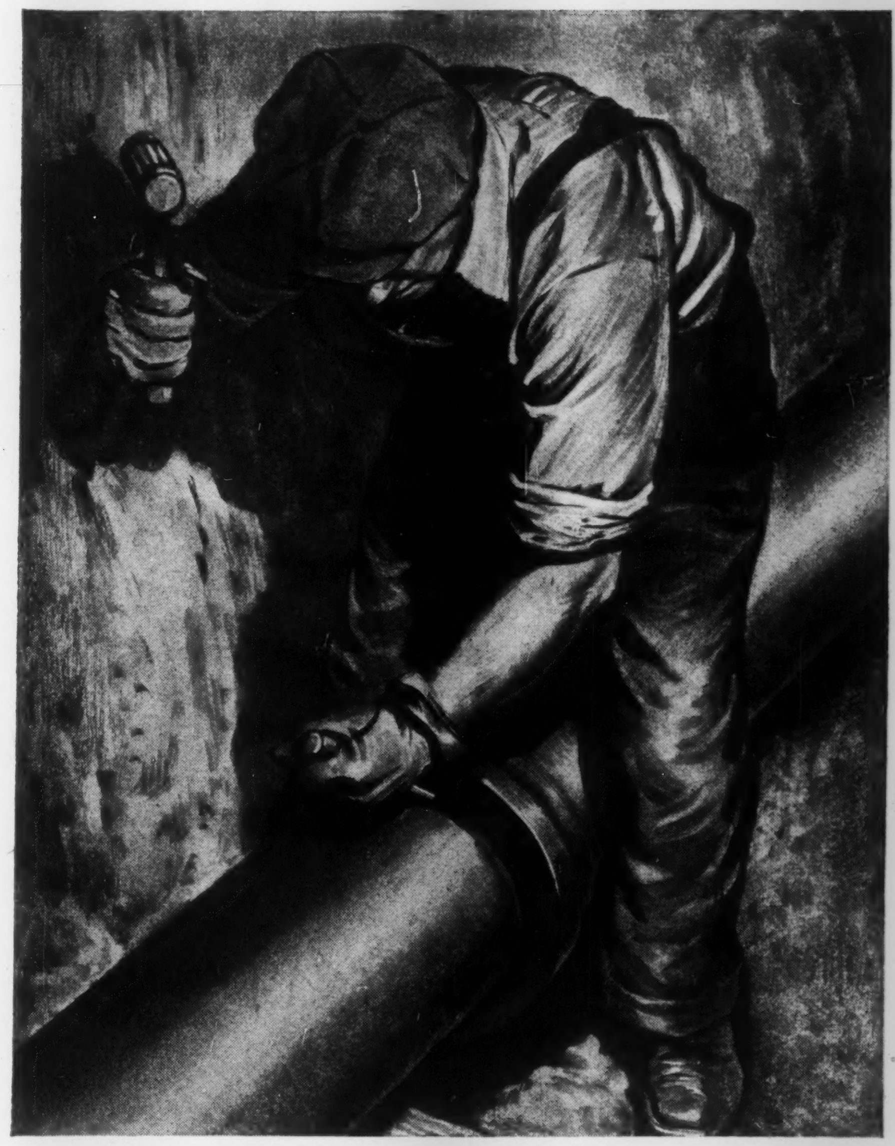

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**SERVES FOR CENTURIES**

# Applications for Admission or Transfer

## *Condensed Records to Facilitate Comment from Members to Board of Direction*

MAY 1, 1946

NUMBER 5

*The Constitution provides that the Board of Direction shall elect or reject all applicants for admission or for transfer. In order to determine justly the eligibility of each candidate, the Board must depend largely upon the membership for information.*

*Every Member is urged, therefore, to scan carefully the list of candidates published each month in* CIVIL ENGINEERING *and to furnish the Board with data which may aid in determining the eligibility of any applicant.*

*It is especially urged that a definite recommendation as to the proper grading be given in each case, inasmuch as the grading must be based upon the opinions of those who know the applicant personally as well as upon the nature and extent of his professional experience. Any facts derogatory to the personal character or professional reputation of an applicant should be promptly communicated to the Board.*

*Communications relating to applicants are considered strictly confidential.*

*The Board of Direction will not consider the applications herein contained from residents of North America until the expiration of 30 days, and from non-residents of North America until the expiration of 90 days from the date of this list.*

### MINIMUM REQUIREMENTS FOR ADMISSION

| GRADE | GENERAL REQUIREMENT | AGE | LENGTH OF ACTIVE PRACTICE | RESPONSIBLE CHARGE OF WORK |
|---|---|---|---|---|
| Member | Qualified to design as well as to direct important work | 35 years | 12 years | 5 years RCM* |
| Associate Member | Qualified to direct work | 27 years | 8 years | 1 year RCA* |
| Junior | Qualified for subprofessional work | 20 years | 4 years | |
| Affiliate | Qualified by scientific acquirements or practical experience to cooperate with engineers | 35 years | 12 years | 5 years RCM* |

* In the following list RCA (responsible charge—Associate Member standard) denote years of responsible charge of work as principal or subordinate, and RCM (responsible charge—Member standard) denotes years of responsible charge of IMPORTANT work, i.e., work of considerable magnitude or considerable complexity. The time statements shown are as presented by the applicant.

### APPLYING FOR MEMBER

**Bailey, Maynard D.**, Detroit, Mich. (Age 52) (RCA 17.1 RCM 12.0) May 1934 to April 1945 Bridge Project Engr., and April 1945 to date Dist. Bridge Engr., Michigan Highway Dept.

**Barrows, Daniel Joseph**, (Assoc. M.) Mt. Vernon, N.Y. (Age 37) (RCA 5.2 RCM 7.2) Feb. 1940 to July 1943 and March 1946 to date Civ. Engr., Spencer, White & Prentis, Inc.; in the interim Capt., Corps of Engrs., U.S. Army.

**Blaney, Daniel Thomas**, Atlanta Ga. (Age 46) (RCA 6.4 RCM 16.1) June 1943 to date Land Planning Consultant, FHA; previously with Olmsted Bros., Landscape Archts. and Engrs., Brookline, Mass.

**Bohan, John Joseph**, Chicago, Ill. (Age 40) (RCA 8.5 RCM 7.9) May 1941 to date with CEC, USNR, being Lt. (jg), Lt., and Lt. Comdr.; previously Eng. Inspector, Grade 4, New York Board of Water Supply; Eng. Asst., Grade 3, New York Board of Transportation.

**Brodahl, Jack Asbjorn Aune** (Assoc. M.), Oslo, Norway. (Age 44) (RCA 7.1 RCM 8.3) Dec. 1937 to date with Astrup & Aubert A/S, Oslo, Norway, since Dec. 1939 as Constr. Engr.

**Christensen, Nephi Albert** (Assoc. M.), Fort Collins, Colo. (Age 43) (RCA 3.0 RCM 7.6) Sept. 1938 to Dec. 1942 and Sept. 1945 to date Dean of Eng., Colorado A & M Coll.; in the interim Chief Engr., Rocket Branch, Ballistics Research Laboratory; Chief of Research Branch, Aberdeen Proving Ground.

**Collier, Alton Ray**, Omaha, Nebr. (Age 48) (RCM 23.8) May 1942 to date with U.S. Engr. Corps, Omaha, Nebr., since Dec. 1943 on flood-control investigation and reports; previously with Remington Arms Co., Bridgeport, Conn.; Connecticut State Highway Dept.

**Couloheras, Ernest**, Corpus Christi, Tex. (Age 39) (RCA 5.4 RCM 8.4) Sept. 1942 to date with CEC, USNR, being Lt. and (since April 1944) Lt. Comdr.; previously Asst. Engr., Board of Levee Commrs., Orleans Levee Dist.; Engr. with Dept. of Conservation for State of Louisiana.

**Cropper, George Bertrand** (Assoc. M.), Ocean City, Md. (Age 37) (RCA 3.6 RCM 6.9) Nov. 1940 to June 1942 and Jan. 1946 to date consulting practice, Ocean City, Md.; in the interim with Corps of Engrs., U.S. Army, finally as Major.

**De Costa, Joseph David** (Assoc. M.), Oakland, Calif. (Age 46) (RCA 4.2 RCM 16.3 Jan. 1930 to June 1943 and Jan. 1946 to date with East Bay Water Co. and (later) East Bay Municipal Utility Dist.; in the interim Lt. Col., U.S. Army, being Public Works and Public Utilities Officer for Netherlands.

**Dunn, Allison Van Vliet** (Assoc. M.) Evanston, Ill. (Age 47) (RCA 9.1 RCM 10.6) July 1929 to date with Dept. of Interior, Natl. Park Service, since Nov. 1939 being Hydr. Engr.

**Ernst, Thomas Edward**, Arlington, Va. (Age 39) (RCA 2.7 RCM 11.3) Nov. 1940 to date with Corps of Engrs., U.S. Army, since Dec. 1942 as Major; at present Chief, Purchasing Branch.

**Grand, Harris** (Assoc. M.) Brooklyn, N.Y. (Age 43) (RCA 6.3 RCM 12.6) July 1940 to date Gen. Contr. on highway work; previously Engr. & Gen. Mgr. of Highway Constr. for Tully & Di Napoli, Inc., Gen. Contrs., New York City.

**Hawke, James Philip** (Assoc. M.) Oakland, Calif. (Age 35) (RCA 2.4 RCM 6.0) Dec. 1945 to date Designing Engr.; previously Engr. Officer, U.S. Marine Corps in various positions; Structural Engr., Design Sec., Public Works Office, 12th Naval Dist., San Francisco, Calif.; Associate Structural Engr., Bureau of Yards & Docks, U.S. Navy.

**Henderson, John Mellish**, Atlanta, Ga. (Age 41) March 1942 to date Major and Lt. Col., U.S. Army, being San. Engr., Malaria Control, and Member of Antilles Dept. Malaria Board, with Eng. Div., Malaria Control, War Areas, U.S. Public Health Service, Atlanta, Ga.; Jan. 1944 to date (at intervals) also Prof. of San. Sci., School of Public Health, Columbia Univ., New York City.

**Herbert, James Keller**, Long Beach, Calif. (Age 37) (Claims RCA 3.0 RCM 8.0) Sept. 1930 to date with Corps of Engrs., since Sept. 1943 as Commanding Gen., Los Angeles Port of Embarkations.

**Hunter, Robert Charles**, Los Angeles, Calif. (Age 58) (RCA 12.0 RCM 9.4) 1917 to date with U.S. Engrs., since Feb. 1946 being U.S. Dist. Engr., Los Angeles Engr. Dist.

**Huntington, Perit Fitch** (Assoc. M.), Minneapolis, Minn. (Age 59) (RCA 6.7 RCM 24.7) Nov. 1923 to date Supt. of Constr., S. J. Groves & Sons Co., Minneapolis, Minn.

**Jennings, Robert Bond** (Assoc. M.), Worthington, Ohio. (Age 44) (RCA 4.1 RCM 14.3) Feb. 1938 to June 1942 and Feb. 1946 to date Manager, Columbus Office, The Trane Co., La Crosse, Wis., in the interim with UEC, USNR, finally as Commander, being Contract Supt., U.S. Naval Air Test Center, Patuxent River, Md.

**Jones, Albert William**, Helena, Montana. (Age 39) (RCA 8.8 RCM 5.2) July 1937 to Sept. 1940, Jan. 1941 to Jan. 1942 and Nov. 1945 to date with Montana Highway Dept. since Nov. 1945 as Design Engr., Bridge Design Dept.; in the interim with U.S. Army, finally as Capt. Jan. 1942 to July 1943 Traffic Engr.

**Kuhns, Ray**, Helena, Mont. (Age 50) (RCA 7.3 RCM 11.9) April 1926 to date with State Highway Comm., Helena, Mont., since Oct. 1943 being Project Control Engr.

**LaFollette, Robert Meredith** (Assoc. M.) Kansas City, Mo. (Age 39) (RCA 4.2 RCM 8.8) Dec. 1945 to date Partner, Charles A. Haskins, Cons. Engr., Kansas City, Mo.; previously with U.S. Army as Area Engr. and Executive Officer; with Smith, Hinchman & Grylls, finally as Asst. Civ. Engr.

**Long, Malcolm Graham**, Billings, Mont. (Age 37) (RCA 6.8 RCM 5.0) June 1942 to date Owner and Operator of construction company; previously Instrumentman and Associate Engr., Indian Service, Dept. of Interior.

**Ludasy, Marcell** (Assoc. M.), Trenton, N.J. (Age 48) (RCA 3.5 RCM 7.6) Sept. 1938 to date Bridge Designer, New Jersey Highway Dept.

**Mayer, Armand**, Paris, France (Age 50) (RCM 9.5) 1943 to date Head of French Aviation Engrs. in Africa, Corsica, and Inspector Gen. in France; previously Head of French Soil Mechanics Laboratory.

**Meyer, Paul Eugene**, Fort Lewis, Wash. (Age 45) (RCA 7.6 RCM 12.5) Feb. 1942 to date with USED, Post Engr., Fort Lewis, Wash., being Engr. (Civ.)P-4; previously Civ. Engr., Constr. Supt. and Forester, Weyerhaeuser Timber Co., Tacoma, Wash.

**Miles, Orson Donald**, Price, Utah. (Age 42) (RCA 10.0 RCM 7.0) May 1936 to date with State Road Comm. of Utah, since May 1945 as Dist. Engr.

**Moyer, Stanley**, Philadelphia, Pa. (Age 40) (RCA 6.2 RCM 11.9) Sept. 1937 to date with Philadelphia Elec. Co., since 1941 being Senior Engr., Mech. Eng. Div.

**Phelps, Byrl Dean**, San Diego, Calif. (Age 49) (RCA 2.0 RCM 17.3) Feb. 1924 to date with City of San Diego, since May 1944 as Asst. Port Director.

**Sagal, Marcus** (Assoc. M), Baltimore, Md. (Age 46) (RCA 10.6 RCM 6.6) Oct. 1928 to date with James Stewart & Co., Inc., since Oct. 1945 as Gen. Supt. in charge of construction of U.S. Naval Hospital, Houston, Tex.

**Sample, Coleman Russell**, New York City. (Age 49) (Claims RCA 5.9 RCM 16.8) Dec. 1918 to date with Ford, Bacon & Davis, Inc., since Jan. 1946 as Senior Engr.

**Sherman, Stewart Israel** (Assoc. M.) New York City. (Age 45) (RCA 4.5 RCM 8.3) Feb. 1933 to date Civ. Engr., Bureau of Eng., Board of Estimate, New York City.

**Shuman, Everett Carlyle** (Assoc. M.), Haddonfield, N.J. (Age 43) (Claims RCA3.2 RCM 14.9) 1944 to date Research Supervisor, Owens-Illinois Glass Co., Berlin, N.J.; previously with Corps of Engrs., War Dept., North Atlantic Div., West Point and Mt. Vernon, N.Y.; Chairman, Dept. of Civ. Eng., Lewis Inst., Chicago.

**Small, Joseph Warder, Jr.** Pittsburgh, Pa. (Age 59) (RCA 13.3 RCM 21.6) 1909 to date with American Bridge Co., since Feb. 1942 being Asst. to Chf. Engr.

**Snyder, Baird, 3rd** (Assoc. M.), Friendship, D.C. (Age 45) (RCA 3.5 RCM 19.1) 1941 to date Assistant Administrator, FWA; previously Deputy Administrator, Wage and Hour Div., Dept. of Labor.

**Staubach, Arnold Baldwin** (Assoc. M.) Austin, Texas. (Age 47) (RCA 3.5 RCM 10.8) Dec. 1933 to date with Texas Highway Dept., Austin, since June 1936 being Area Bridge Engr.

**Thompson, Harry Warren** (Assoc. M.) Los Angeles, Calif. (Age 53)(RCA 9.3 RCM 16.2) Dec. 1945 to date Asst. Chief, Eng. Div. Los Angeles Engr. Dist.; previously (over $3\frac{1}{2}$ years) Lt. Col. and Col., Corps of Engrs. U.S. Army; with U.S. Engr. Dept., Los Angeles Dist.

**Thompson, Robert Andrew, Jr.** (Assoc. M.), San Antonio, Tex. (Age 45) (RCA 8.1 RCM 8.9) June 1941 to date Senior Engr., U.S. Engr. Office, San Antonio (Tex.) Dist.; previously with Willacy County Water Improvement Dist. finally as Gen. Mgr.

**Turner, Homer Root**, Windsor, Conn. (Age 59) (RCA 9.2 RCM 25.7) Feb. 1931 to Oct. 1939 Asst. Highway Engr., and Oct. 1939 to date Associate Highway Engr., Connecticut Highway Dept.

**Ventres, Daniel Brainerd** (Assoc. M.), Jackson-

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ville, Fla. (Age 46) (RCA 8.9 RCM 13.5) July 1939 to date with U.S. Navy at present as Captain, being Public Works Officer and Officer in Charge of Constr., U.S. Naval Air Station, Jacksonville, Fla.

VICKREY, JOHN WILBUR, Sacramento, Calif. (Age 53) (RCA 11.2 RCM 14.0) April 1917 to date with California Div. of Highways, at present being Principal Highway Engr.

WEIDNER, CHARLES KENNETH (Assoc. M.), Washington, D.C. (Age 41) (RCA 10.1 RCM 9.6) June 1941 to date Civ. Engr. Officer, USNR; previously Asst. Supt., Dept. of Buildings and Grounds, Univ. of Washington, Seattle, Wash.

WINICK, CHARLES BORIS (Assoc. M.) Brooklyn, N.Y. (Age 48) (RCA 3.6 RCM 17.9) 1936 to date consulting work; also Jan. 1943 to Aug. 1944 with Lummus Co. and E. B. Badger & Sons, New York City; previously Designer American Gas & Elec. Service, N.Y., Asst. Project Engr., Queens Midtown and Lincoln Tunnels, PWA.

## APPLYING FOR ASSOCIATE MEMBER

BARNEY, WILLIAM JOSHUA, JR. (Junior) New York City. (Age 34) (RCA 2.5 RCM 1.2) Feb. 1937 to Oct. 1940 and Dec. 1945 to date with W. J. Barney Corporation; in the interim with U.S. Navy, finally as Commander.

BOGAN, BERNARD ROBERT (Junior), Chandler, Tex. (Age 34) (RCA 4.3 RCM 1.0) Aug. 1944 to date with U.S. Naval Reserve as Lt. (jg), 1st Lt., and Navigator; previously Senior Eng. Aide, Kaiser Co., Inc., Richmond, Calif.; Junior Engr. Surveyman, U.S. Engrs., Lubbock Army Flying School.

CALDWELL, JOSEPH MORTON, Washington, D.C. (Age 34) (RCA 4.7 RCM 5.5) Jan. 1943 to date Corps of Engrs., U.S. Army; as Liaison Officer, etc., and finally asst. to Branch Chf.; previously with U.S. Engr. Office, finally as Chf. of Hq. Div.

CASTLER, JOSEPH HARRY, Hollywood, Calif. (Age 37) (RCA 3.7) Jan. 1946 to date Structural Designer with Donald Parkinson, Archt.; previously (3 years) Lieut. to Lt. Comdr., USNR; Structural Designer, C. F. Braun & Co.

CHANG, WAN-CHIU, Shanghai, China. (Age 34) (RCA 0.4 RCM 1.6) Oct. 1945 to date Asst. Chf. Engr., Central China Ry. System; previously Professor of Civ. Eng. National Fu-Tan Univ., also (concurrently) Tech. Commr., Central Planning Board and Engr., Gen. Ry. Surveying Corporation, Ministry of Communications; Head, Dept. of Civ. Eng. National Sun Yat-Sen Univ.; Prof. of Civ. Eng., National Central Univ., China.

CHOCOLE, JOSEPH FRANK, Chicago, Ill. (Age 35) (RCA 5.0) March 1936 to date Erection Engr., Chicago Bridge & Iron Co.

COLLIE, ROBERT MONROE (Junior), Houston, Tex., (Age 30) (RCA 7.7) Dec. 1945 to date Res. Engr., Peggy Lake Project for Todd Houston Shipbuilding Corporation; previously Lt., Capt., Major and Lt.-Col., Corps of Engrs. U.S. Army; Chief Mech. Draftsman and Chief Facilities Draftsman, Houston Shipbuilding Corporation.

COMMANDER, AUGUSTINE CATES, Greenville, S.C. (Age 28) (RCA 3.2 RCM 0.6) Sept. 1945 to date Structural Engr. J. E. Sirrine, & Co.; previously Structural Designer, Whitman Requardt & Associates; Estimator and Chief Estimator, Stone & Webster Eng. Corporation.

CONANT, LEWIS FLEET (Junior) Los Angeles, Calif. (Age 34) (RCA 5.0 RCM 3.3) Jan. 1945 to date Partner in the firm, Quinn & Conant, contracts for commercial and industrial buildings; previously Designer and Estimator for manufacturers of vertical doors.

COULTER, RICHARD GALLAHER (Junior), Syracuse, N.Y. (Age 30) (RCA 2.5 RCM 0.5) Nov. 1943 to date Asst. Engr., Holmes, O'Brien & Gere, Cons. Engrs.; previously Design Draftsman, C. C. Combs, Landscape Archts.; Draftsman, New York Central R.R. Co.; Design Draftsman, Chemical Constr. Co.; Technical Asst., Gibbs & Cox, Naval Archts.

DAVY, WALTER EDWIN, Dayton, Ohio. (Age 32) (RCA 1.9 RCM 1.0) June 1941 to date with U.S. Army Air Forces finally as Major; since Oct. 1945 Chf., Operations Sec., Air Installations Div., Air Technical Service Command, Wright Field, Dayton, Ohio; previously with Northwest Eng. Co., Green Bay, Wis.

DE VOS, WOUTER, Parkwood, Johannesburg, S. Africa. (Age 39) (RCA 12.0 RCM 4.8) May 1944 to date Draftsman and later Acting Chf. Engr., Robins Conveyors, S.A. Ltd.; previously Engr. Walsh, Andrews Pty., Ltd.; Designer, Edward L. Bateman, Pty., Ltd., Engrs.

DUNHAM, FRANK CROMIE (Junior), Atlanta, Ga. (Age 32) (RCA 6.0 RCM 1.4) June 1942 to date with Corps of Engrs., U.S. Army finally as Major; previously with Special Eng. Div., The Panama Canal.

EDIGER, OLIN ORLANDO, Wichita, Kans. (Age 36) (RCA 5.3 RCM 3.0) Jan. 1946 to date Owner, The Ediger Eng. Co., Cons. Engr.; previously Project Engr. 102d Naval Constr. Bn.; Res. and Field Engr., Board of Park Commrs., Wichita.

ELLISON, ROBERT JAY, St. Paul, Minn. (Age 30) (RCA 1.2) Jan. 1938 to April 1941 and Nov. 1945 to date with Portland Cement Co.; in the interim 1st. Lt. to Major U.S. Army, Antiaircraft Corps.

FIELDS, RICHARD CLORE (Junior), Greensburg, Pa. (Age 28) Nov. 1944 to date Structural Engr., Gannett, Fleming, Corddry & Carpenter, Inc.; previously Structural Engr., All American Aviation Co., Wilmington, Del.; Structural Engineer, Dravo Corporation; Structural Detailer, American Bridge Co.

FLOYD, WESLEY RUFUS (Junior), Norfolk, Va. (Age 35) (RCA 4.3 RCM 0.7) Nov. 1938 to date with Corps of Engrs., War Dept., U.S. Engr. Office, since Sept. 1944 Engr. P-3 to P-4 (Soils Mechanics), until Jan. 1946 at Boston, Mass., and after Jan. 1946 at Norfolk, Va.

FRIEND, ARDO MARVIN, Dayton, Ohio. (Age 31) (RCA 2.9 RCM 4.4) Nov. 1938 to June 1942 and March 1946 to date with Putnam & Woolpert, Dayton, Ohio, being Res. Engr. and Asst. Chf. Engr.; in the interim with Corps of Engrs., U.S. Army.

GATES, LESLIE CLIFFORD, Beckley, W.Va. (Age 27) (RCA 4.7) Nov. 1945 to date Associate in firm, Ferguson Gates Eng. Co., Beckley, W.Va.; Sept. 1941 to Jan. 1946 with U.S. Army, finally as Major.

GORDON, ELLIS SAMUEL, Norfolk, Va. (Age 36) (RCA 6.9 RCM 4.2) Nov. 1939 to date with U.S. Coast Guard as Lt. and since Oct. 1943 Lt. Comdr., successively at Cleveland, Ohio, Ketchikan, Alaska, and Norfolk, Va.

GRUMM, WATSON JUSTUS, Sacramento, Calif. (Age 33) (RCA 4.1 RCM 2.2) Feb. 1946 to date Terminal leave U.S. Navy. Dec. 1942 to Jan. 1946 with U.S. Navy as Lt. (jg), Lt., Lt. Comdr., and finally Comdr.; previously with Standard Oil Co. of California.

GUDEN, RICHARD MORTIMER (Junior), Lynbrook, N.Y. (Age 34) (RCA 12.1 ) 1939 to date with U.S. Navy, Public Works Div., Navy Yard, Brooklyn, N.Y.

HAGEDORN, JOHN CARL (Junior) Maspeth, N.Y. (Age 30) Jan. 1946 to date Design Engr., Chas. Pfizer & Co., Inc., Brooklyn, N.Y.; previously with U.S. Navy, Brooklyn (N.Y.) Yard, finally as Naval Archt.

HNOT, WALTER RUDOLPH (Junior) Plainfield, N.J. (Age 32) (RCA 5.5 RCM 3.5) May 1937 to date with Standard Oil Development Co., Elizabeth, N.J., since Sept. 1940 as Designer.

HOOPER, JOHN CALDWELL, Anchorage, Alaska. (Age 38) (RCA 8.5 RCM 0.2) 1937 to date with Bureau of Air Commerce (CAA) at present being Supt. (P-7), Air Navigation Facilities, Plant & Structures Branch, Eighth Region, Anchorage, Alaska.

JANES, JOHN NICHOLAS, Vancouver, B.C., Canada. (Age 31) (RCA 2.5) Aug. 1945 to date Structural Designing Engr. with H. A. Simons Cons. Engr.; previously Asst. Engr., Dominion Constr. Co., Ltd., Cons. Engrs. and Contrs., Vancouver, B.C.; Draftsman, British Columbia Pulp & Paper Co., Ltd., Port Alice, B.C.; with Eng. Dept., City of Vancouver, B.C.

JOHNSON, OSCAR LLOYD (Junior), Aurora, Ill. (Age 34) (RCA 2.9) July 1945 to date Sales Engr., Barber-Greene Co., Aurora, Ill.; Feb. 1942–June 1945 with TVA, finally as Asst. Civil Engr.; previously Draftsman, Howard Needles, Tammen, & Bergendoff.

JONES, WILLIAM PERRY, JR. (Junior), Jerseyville, Ill. (Age 34) (RCA 1.9 RCM 1.2) Feb. 1937 to date with Corps of Engrs., U.S. Army, finally as Lt. Colonel being Commander 1308th Engr. General Service Regt. at Pusan, Korea.

JURJEVICH, MARKO ALEXANDER, Oakland, Calif. (Age 35) (RCA 4.5) Jan. 1946 to date Detailer and Designer, J. Y. Long Co., Engrs.; previously with U.S. Dept. of Agriculture, finally as Associate Civ. Engr..

KARP, ALFRED (Junior), Boston, Mass. (Age 33) (RCA 4.1 RCM 1.1) Nov. 1940 to date with CEC, USNR, being Lt. (jg), Lt., Lt. Commdr., and since Aug. 1945 Commdr., being Materials Div. Head, Advance Base Dept., Bureau of Yards and Docks, Washington, D.C.

KARRAN, GEORGE VARBLE, JR., Jacksonville, Fla. (Age 31) (RCA 2.9 RCM 3.5) Nov. 1945 to date with Steel Div., Gibbs Corporation, Jacksonville, Fla., previously Lt., CEC, U.S. Navy; with Aetna Iron & Steel Co.

KOELZER, VICTOR ALVIN (Junior), Lakehurst, N.J. (Age 31) (RCA 5.6) Jan. 1943 to date Ensign, CEC, U.S. Navy; previously Jun. Engr., and Asst. Engr., U.S. Engr. Office, Louisville, Ky.; with U.S. Geological Survey.

LANGE, KENNETH WILSON (Junior) Birmingham, Ala. (Age 29) (RCA 3.4) June 1941 to date with Chicago Bridge & Iron Co., since Dec. 1945 as Contr. Engr.

LEADABRAND, JOSEPH ALBRIGHT (Junior), Chicago, Ill. (Age 32) (RCA 6.0) March 1946 to date Bureau Constr. Engr., Soil-Cement Bureau, Portland Cement Association; previously Engr., Material Container Div., Forest Products Laboratory, Dept., of Agriculture; Engr., Soil Cement Bureau, Portland Cement Association.

LIN, TUNG-YEN (Junior), Kobi, China (Age 34) (RCA 2.1 RCM 7.8) Oct. 1945 to date Commr., Taiwan Office, Ministry of Economics, Chinese Natl. Govt.; previously Senior Engr. and Head of Lanchow Office, Chinese Bridge Co.; Chf. Engr. Kung Sing Eng. Co.; Chf. of Track-laying Squad, Suifu-Kunming Ry.

LINDSAY, RICHARD EDWARD, Azusa, Calif. (Age 39) (RCA 4.7) Feb. 1929 to date with Los Angeles County Flood Control Dist., since Sept. 1941 being Hydrographer, Sec. Head, Precipitation and Evaporation Sec., and (since Nov. 1944) Runoff and Reservoir Sec.

LOWE, WILLIAM JOSEPH (Junior), Los Angeles, Calif. (Age 30) (RCA 3.9) July 1939 to date with U.S. Engr. Office, Los Angeles, Calif., since March 1944 as Associate Engr. (structural).

MCCORMICK, FRANK JAMES, Manhattan, Kans. (Age 39) (RCA 6.4 RCM 0.5) Sept. 1939 to June 1944 and Nov. 1945 to date with Kansas State Coll., finally as Assoc. Prof. of Applied Mechanics; in the interim Stress Analyst (Senior), Glenn L. Martin Co.

MCGRATH, THOMAS EDWARD JOSEPH (Junior), Sheffield, Pa. (Age 34) (RCA 10.3) At present Constr. Supt., Gilbert Associates, Inc.; previously (4$^1/_2$ years) Capt., Corps of Engrs., U.S. Army; Constr. Engr. for United Refining Co., Warren, Pa.

MCLEAN, WILLIAM ROBINSON (Junior), Chattanooga, Tenn. (Age 34) (RCA 5.2) Sept. 1937 to date with TVA, at present being Elec. Engr. II.

MCNAIR, ARTHUR JAMES (Junior), Boulder, Colo. (Age 32) (RCA 5.7 RCM 0.5) Sept. 1935 to Sept. 1942 Instructor, and Sept. 1942 to date Asst. Prof. of Civ. Eng., Univ. of Colorado.

MADDEN, JOHN THOMAS, San Pedro, Calif. (Age 45) (Claims RCA 6.0 RCM 6.4) Aug. 1941 to June 1945 Chf. Engr. of Constr., Shipbuilding Div., and June 1945 to date Project Engr., Consolidated Steel Corporation; previously Structural Engr., Leslie Salt Co.

MARTIN, HUGER FRED (Junior), Dallas, Tex. (Age 34) (RCA 4.5 RCM 6.0) June 1939 to May 1942 and Oct. 1945 to date Field Engr., Infilco, Inc. (formerly International Filter Co.), Chicago, Ill.; Plant. Engr., Lone Star Ordnance Plant, Tex.; in the interim Constr. Supt., R. H. Folmar, Gen. Contr., Austin, Tex.

MILLER, ROBERT LAWRENCE, Milwaukee, Wis. (Age 35) (RCA 10.1) April 1937 to date Field Engr., Portland Cement Asssociation.

MINEHAN, CHESTER HERBERT, Newton, Mass. (Age 34) (RCA 3.2) April 1941 to date, with United States Geological Survey, since Feb. 1944 as Asst. Engr.

MOONEY, WALTER EDWARD, Martinsville, Va. (Age 33) (RCA 1.2 RCM 10.3) July 1934 to date with Eng. Dept., E. I. du Pont de Nemours & Co., since Jan. 1939 as Constr. Engr.

MOSKOWITZ, KARL (Junior), Santa Rosa, Calif. (Age 35) (RCA 7.6) Dec. 1945 to date Highway Engr., U.S. PRA; previously with U.S. Army, being 2nd Lt. and 1st Lt., until May 1942 with Air Corps, after May 1942 with Corps of Engrs.; with U.S. PRA.

NELSON, OSCAR, Peoria, Ill. (Age 36) (RCA 5.3) At present with Foley & Brown, Archt. Engr.; previously Lieut., USNR; Structural Designer and Detailer, Graham-Anderson-Probst & White.

NIHOUL, RENE ARMAND, Brussels-Ixelles, Belgium. (Age 36) (RCA 12.0 RCM 0.9) 1933 to date with Centre Belgo-Luxembourgeois d'information de L'Acier, finally as Manager.

OLIVER, WILLIAM ISAAC, JR., Somers Point, N.J. (Age 35) (RCA 3.3 RCM 2.0) Jan. 1946 to date Engr., Sollitt Constr. Co., South Bend, Ind.; previously Supt. of Maintenance, Evansville (Ind.) Shipyard, Field Engr., Ryan Constr. Corporation, Evansville, Ind.; Civ. Engr., Stone & Webster Eng. Corporation, Boston, Mass.

PALADINO, PETER ROMEO (Junior), Pittsfield, Mass. (Age 35) (RCA 2.6) 1942 to March 1946 with U.S. Army; previously Archt. Inspector, FHA; Structural Designer, Gen. Elec. Co.; Engr. and Bldr. (private practice), Pittsfield, Mass.; Constr. Engr., The Austin Co., New York City.

POPOV, EGOR PAUL, San Francisco, Calif. (Age 33) (RCA 3.4 RCM 5.4) Sept. 1945 to date graduate student, Stanford Univ., previously Design Engr. Aerojet Eng. Corporation; Designer, Goodyear Tire & Rubber Co.; Asst. to Chief Engr. Southwestern Portland Cement Co.

REYES, RAFAEL, San Juan, Puerto Rico. (Age 40) (RCA 4.5) Sept. 1937 to Oct. 1940 Asst. Engr., and Nov. 1944 to date Associate Engr., Water Resources Authority, Puerto Rico; previously Capt., Corps of Engrs., U.S. Army.

RUPP, CARL FREDERICK (Junior), Cliffside Park, N.J. (Age 35) (RCA 3.4) Dec. 1940 to Dec. 1942 Jun. Engr., and Aug. 1944 to date Asst. Engr., Port of New York Authority; in the interim Materials Engr., Bureau of Yards & Docks Navy Dept.; Eng. Asst., New York City Tunnel Authority.

STULL, RUSSE DAVIS, Kansas City, Mo. (Age 40) (RCA 2.7) Aug. 1937 to Dec. 1942 and Sept. 1943 to date with U.S. Engr. Office, Kansas City, Mo., since Sept. 1943 as Engr. P-2, Soils Mechanic; in the interim Area Engr., Kansas WPA, Topeka, Kans.

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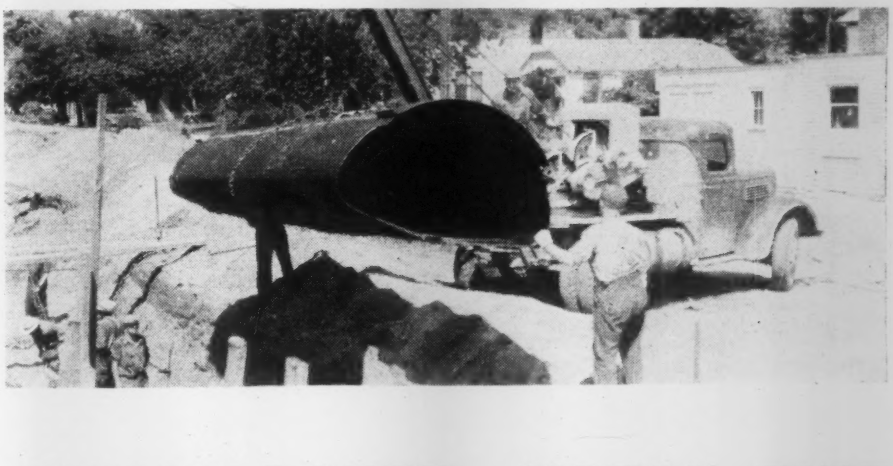

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**Sweningsen, Oliver, Jr.**, San Francisco, Calif. (Age 27) (RCA 3.0) Sept. 1940 to May 1942 and Oct. 1945 to date with Pacific Tel. & Tel. Co., finally as Engr.; in the interim 1st Lt., U.S. Army Air Corps.

**Taylor, Robert Louis** (Junior), Ocala, Fla. (Age 34) (RCA 4.2) Sept. 1938 to July 1940 and March 1941 to date with Water Resources Div., U.S. Geological Survey, since Nov. 1942 being Asst. Engr.; in the interim Draftsman, Florida State Road Dept.; Draftsman and Designer, Southern Engrs. and Architects.

**Vera-Sanchez, Justo Gentil**, Milwaukee, Wis. (Age 32) (RCA 1.4) Jan. 1944 to March 1946 Graduate training course, Allis-Chalmers Mfg. Co., Milwaukee, Wis.; previously graduate student, State Univ. of Iowa; Engr. of Public Utilities, Bureau of Public Works, Dept. of Bolivar, Cartagena, Colombia.

**Weight, William King** Independence, Calif. (Age 35) (RCA 4.9) June 1936 to Aug. 1942 and Dec. 1945 to date Jun. Civ. Engr., Dept. of Water & Power, Los Angeles, Calif.; in the interim with Army Air Corps as 1st Lt. and Capt., serving as San. Engr.

**Wootan, John Thomas, Jr.**, San Bernardino, Calif. (Age 37) (RCA 10.1) July 1934 to date with Southern California Gas Co., Los Angeles, since July 1939 being Eng. Asst., Class A.

## APPLYING FOR JUNIOR

**Behling, Ray Johnson**, Chicago, Ill. (Age 24) Feb. 1946 to date Jun. Engr., International Harvester Co.; previously Inspection Engr., Standard Oil Co., Indiana; Engr., Boeing Aircraft Co.

**Bentson, Robert Joseph, Jr.**, Chicago, Ill. (Age 25) (RCA 0.7) Sept. 1943 to date with USNR, at present as Lt. (jg), since July 1945 Industrial Command, U.S. Naval Repair Base, San Diego, Calif.

**Dix, Maynard Dwight**, Muscatine, Iowa. (Age 30) (RCA 1.6) 1939 to 1941 and Oct. 1945 to date with Stanley Eng. Co., Muscatine, Iowa, at present being Resident Engr.; in the interim with U.S. Army.

**Gamble, William Arthur, Jr.**, Lafayette, La. (Age 29) (RCA 1.4) Dec. 1945 to date Res. Engr., Louisiana Dept. of Public Works; previously with U.S. Army, finally as Captain, being Company Comdr., Corps of Engrs.; Rodman and Instrumentman, Magnolia Petroleum Co., Dallas, Tex.

**Gilbert, Roy Thomas**, Hannibal, Mo. (Age 29) (RCA 0.1) Oct. to Nov. 1945 Company Engr., Permanente Metal Corporation, Castroville, Calif. June 1940 to Dec. 1942 Minor Eng. Aide, Under Eng. Aide and Asst. Eng. Aide, TVA.

**Hunt, Charles Alden**, Jackson, Mich. (Age 28) June 1940 to Feb. 1941 and Oct. 1945 to date Draftsman, Fargo Eng. Co.; in the interim Draftsman, Dry Dock Engrs., New York City.

**Hyde, Joseph Bell, Jr.**, Gardena, Calif. (Age 27) Feb. to July 1943 and Oct. 1945 to date Structural Engr., D. R. Warren Co., Los Angeles, Calif.; in the interim P-3 Associate Engr., USED, Sacramento Dist.; previously Constr. Engr., U.S. Engineers, San Francisco, Calif.; Constr. Inspector, PRA.

**Moretto, Oreste**, Urbana, Ill. (Age 30) 1943 to date graduate student, Univ. of Illinois; previously Engr., PRA of Argentina.

**Olsen, Kenneth Emil**, Oakland, Calif. (Age 26) June 1942 to date with Kaiser Co., Inc., finally as Senior Engr.; previously Junior Engr., Columbia Steel Co., Pittsburg, Calif.

**Roth, John Albert**, Philadelphia, Pa. (Age 24 (RCA 0.4). At present Jun. Asst. Engr. with F. H. Dechant, Philadelphia, Pa., previously Radio Technician, U.S. Navy; Field Engr., The Pitometer Co.

**Ruffin, Edward Harrison**, Baltimore, Md. (Age 31) Sept. 1939 to April 1941 and Jan. 1946 to date Jun. Civ. Engr., U.S. Engr. Dept.; in the interim Capt., FA., U.S. Army.

**Russell, Robert Welsh**, Frederick, Md. (Age 24) (RCA 0.3) Jan. 1946 to date Jun. Partner, T. Edgie Russell, Gen. Contr. previously (2$^{2}/_{3}$ years with U.S. Army, finally as Company Comdr.

**Walter George Winvon**, Florence, Ala- (Age 28) (RCA 2.6) Dec. 1945 to date Engr., Reynalite Div., Reynolds Metals Co., Sheffield, Ala.; previously with U.S. Army; Engr., Reynolds Alloy Co., Listerhill, Ala.

**Wilson, Walter Brownlee, Jr.**, Lafayette, Ind. (Age 28) Sept. 1945 to date Graduate Asst. Joint Highway Research Project, Purdue Univ., Lafayette, Ind.; previously Instructor in Civ. Eng., Virginia Military Inst., Lexington, Va.

**Young, George Allen**, Forest Park, Ill. (Age 28) (RCA 0.5) July 1942 to Nov. 1945 with CEC, USNR, being Ensign, Lt. (jg), and Lt.; previously Engr., Scott County Highway Dept.

**Zee, Tsu Yao**, St. Louis, Mo. (Age 28) (RCA 6.2) July 1945 to date Chinese Govt. Trainee with Missouri Pacific R.R.; previously with Chinese Govt. finally Asst. Engr., Office of Bridge Engrs., Ministry of Communications.

## 1942 GRADUATES

### UNIV. OF CIN.
(B.S. in C.E.)

| | Age |
|---|---|
| Chapman, Erskine Clifford | (26) |

### N.C. STATE COLL.
(B.S. in C.E.)

| | |
|---|---|
| Goldman, Stanley | (26) |

## 1943 GRADUATES

### CASE SCHOOL OF APPLIED SCI.
(B.S. in C.E.)

| | |
|---|---|
| Snow, Glenn Warren | (24) |

### MANHATTAN COLLEGE
(B.S. in C.E.)

| | |
|---|---|
| Costello, Joseph Vincent | (24) |

## 1944 GRADUATES

### UNIV. OF COLO.
(B.S. in C.E.)

| | |
|---|---|
| Dascenzo, Robert William | (23) |

### MANHATTAN COLL.
(B.C.E.)

| | |
|---|---|
| Vowinkel, Edward August | (23) |

### COLL. OF CITY OF N.Y.
(B.C.E.)

| | |
|---|---|
| Brown, Herbert Clark | (24) |
| Goodman, Alvin Solomon | (21) |

### UNIV. OF WIS.
(B.S. in C.E.)

| | |
|---|---|
| Beck, Earl Joseph | (22) |

## 1945 GRADUATES

### UNIV. OF SO. CALIF.
(B.S. in C.E.)

| | |
|---|---|
| Graessle, Howard David, II | (20) |

### ILL. INST. TECH.
(B.S. in C.E.)

| | |
|---|---|
| Pappmeier, John Harold | (22) |

### GEORGE WASHINGTON UNIV.
(B.C.E.)

| | |
|---|---|
| Skiles, James Joy | (30) |

### YALE UNIV.
(B.E.)

| | |
|---|---|
| Dexter, Philip Roswell | (23) |

## 1946 GRADUATES

### CALIF. INST. TECH.
(B.S. in C.E.)

| | |
|---|---|
| Anderson, John Arthur | (20) |
| Fuller, Thomas Lester | (20) |
| Hicks, Donald Beery | (21) |
| Jurach, Paul John | (21) |
| McCann, Hal Dane | (20) |
| Rice, Jerry H | (20) |
| Ross, Willard Allen | (25) |
| Warner, Richard Calvin | (21) |

### UNIV. OF COLO.
(B.S. in C.E.)

| | |
|---|---|
| Abbott, Robert Jefferson, Jr. | (20) |
| Blensly, Robert Conrad | (21) |
| Carlson, Warren Ore | (20) |
| Dickey, Joe Ben, Jr. | (20) |
| Ellingson, Harold Grant | (20) |
| Farrar, Chapman Oscar | (21) |
| Gerke, Richard Carl | (20) |
| Haughton, William Robert | (21) |
| Hunter, Robert Kent | (20) |
| Leonard, Richard Clayton | (20) |
| McLaughlin, Charles Elmer | (20) |
| Miller, Eugene Wilbur | (22) |
| Moorman, James Bolling, Jr. | (20) |
| Morgan, Philip Royal, Jr. | (20) |
| Morrow, Lawrence Smith | (20) |
| Morton, Ben Lincoln | (20) |
| Myers, William Dee | (22) |
| Perry, Robert Blakeley, Jr. | (20) |
| Renz, Richard Warren | (20) |
| Ross, James Knox, Jr. | (20) |
| Weaver, Wayne Loren | (20) |
| Williams, Walla Glenn, Jr. | (25) |
| Young, Robert C. | (20) |

(B.S. in Arch. Eng.)

| | |
|---|---|
| Svedlund, Joel Edmond | (26) |

### COOPER UNION
(B.C.E.)

| | |
|---|---|
| Schwartz, Joseph George | (21) |

### ILL. INST. TECH.
(B.S. in C.E.)

| | |
|---|---|
| Buchanan, Robert Duncan | (20) |
| Neil, Forrest Christian | (20) |

### UNIV. OF ILL.
(B.S. in C.E.)

| | |
|---|---|
| Butler, Robert Immell | (20) |

### UNIV. OF MD.
(B.S. in C.E.)

| | |
|---|---|
| Spramer, James Sloan | (21) |

### COLL. OF CITY OF N.Y.
(B.C.E.)

| | |
|---|---|
| Ricciardi, Vincent Ralph | (21) |

### UNIV. OF TEX.
(B.S. in C.E.)

| | |
|---|---|
| Moffat, Robert Emerson | (26) |

### WORCESTER POLY. INST.
(B.S. in C.E.)

| | |
|---|---|
| Bingham, William Russell | (21) |

*The Board of Direction will consider the applications in this list not less than thirty days after the date of issue.*

# RECENT BOOKS

*New books donated by the publishers and filed in the Engineering Societies Library, or in the Society's Reading Room. Notes regarding books are taken from the books themselves, edited by the staff of the Society or of the Library. Books in the Library may be borrowed by mail by Society members for a small handling charge.*

**Aerial Navigation.** By H. E. Benham, John Wiley & Sons, New York: Chapman & Hall, London, 1945. 344 pp., illus., diagrs., charts, tables. $8^{3}/_{4} \times 5^{1}/_{2}$ in., cloth, $4. Beginning with a description of the characteristics of the earth and the methods of depicting all or parts of it on charts or maps, this book proceeds to describe the underlying principles of the main methods of aerial navigation. The effective techniques for applying these fundamentals to practical navigation are explained in detail with a wealth of helpful illustrations. A brief glossary of terms and abbreviations is appended.

**Production Illustration**, the Techniques and Applications of Perspective Engineering Drawings. By J. Treacy. John Wiley & Sons, New York; Chapman & Hall, London, 1945. 202 pp., illus., diagrs., charts, tables, $9^{1}/_{4} \times 11^{1}/_{2}$ in., cloth, $4. Perspective drawings were widely adopted during the war as a medium for presenting engineering facts, especially to inexperienced workers unfamiliar with blueprints. This book presents the forms and processes of production illustration in simple form. Part one deals with the actual preparation of production illustrations, including drafting and shading techniques, short-cuts, perspective methods, and aids to reproduction. Part two shows why, when, and where production illustration is of use in industrial production. The book is profusely illustrated with examples of actual production drawings.

**Rights of Trains**, a Complete Analysis of Single Track Standard Code Rules, 3 ed. By the late H. W. Forman; revised by P. Josserand. Simmons-Boardman Publishing Corp., New York and London, 1945. 561 pp., diagrs., charts, tables, $7^{1}/_{2} \times 4^{3}/_{4}$ in., cloth, $3.50. This manual analyzes the Standard Code of Operating Rules of the Association of American Railroads as applied to single and double track. It completely explains and illustrates train rules, train orders and transportation problems of the operating department of any American railroad. Reasons for the rules are given, and questions and answers likely to be met in rules examinations are included to test the reader's understanding of the applications of the rules.

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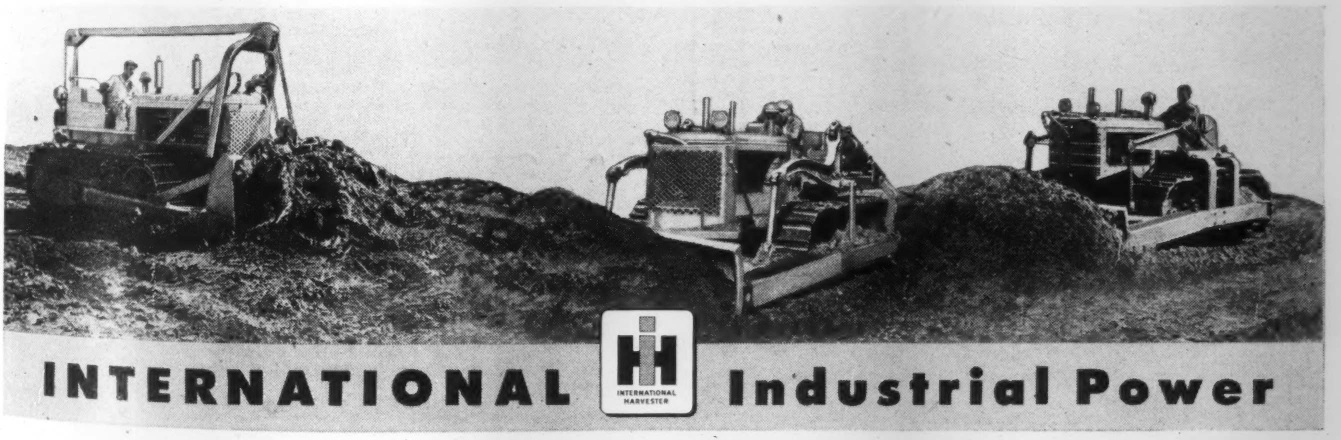

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*A weekly bulletin of engineering positions open is available to members of the cooperating societies at a subscription of $3 per quarter or $10 per annum, payable in advance.*

## MEN AVAILABLE

Civil Engineer; Jun. ASCE; 32; single; registered civil engineer with 9 years' experience—highways, bridges, and sewers, both design and construction. Would like connection such as field engineer or estimator for general contractor. Available immediately. Location preferred, East. C-264.

Civil Engineer; Assoc. M. ASCE; 37; married; evening graduate; experience includes 6 years industrial building construction; 10 years planning, inspection, and some supervision of public improvements—sewers, water, airport facilities for FWA; 3 years as lieutenant, Civil Engineer Corps, USN, advanced base and waterfront construction in Europe and public works in the United States. Desire connection in New York City area. C-265.

Civil Engineer; Jun. ASCE; 25; M.S.C.E.; Iowa State College, 1942; 2½ years' experience, including levee and highway construction, estimating, highway research, and traffic engineering; 3½ years Army and Navy as aeronautical engineering officer (Lt., U.S.N.R.). Desire permanent position in Southwest or Rocky Mountain states in highway, airport, or traffic engineering. C-266.

**WANTED**

Civil Engineer, Architect or equivalent experience, capable of practical application and original thinking for research on building material uses in Research and Development Department of progressive expanding organization, producing building materials. New York Metropolitan area.

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Construction and Maintenance Manager; Jun. ASCE; Commander, U.S. Navy Construction and Maintenance Battalions (Seabees); age 35; licensed professional engineer; graduate of technical college; 17 years' training and experience in design, construction, and maintenance of large-scale institutional and industrial projects. C-267.

Civil Engineer; Assoc. M. ASCE; age 39; B.S. in C.E., plus graduate study; professional engineer, Pennsylvania; experienced in industrial, railroad, highway, and municipal construction and surveying; 11 years in charge of industrial construction. Desire permanent position. Location not important. Experienced in labor and management problems. C-268.

Specification Writer; Jun. ASCE; 29; single; 2½ years writing detailed specifications and handling charge order negotiations for construction of foundations, roads, tracks, sewers, gas lines, masonry work. Location preferred, San Francisco or Los Angeles. Available immediately. C-269.

Lieutenant, Civil Engineer Corps, U.S.N.R.; Jun. ASCE; B.C.E. degree (structural), 1943; age 27; single. Available June 1, 1946. Civilian experience consists of work in a structural steel fabricating plant. Naval experience consists of 2½ years' duty in Construction Battalion Maintenance Unit and contract termination work. Experience data available upon request. C-270.

Civil Engineer; Assoc. M. ASCE; married; 32; one child; B.S. degree, 1936; 2½ years' piping, structural design, layout, and construction supervision for public utility; 7 years' varied construction experience, 5 on duty with Army Engineers; Lt. Col. on terminal leave; desire permanent connection with contractor or as assistant plant engineer. C-271.

Construction Engineer; Assoc. M. ASCE; 42; Massachusetts Institute of Technology, 1925; licensed; 21 years' experience on supervision of major construction work; experience covers all phases of building construction—housing, highway, sewer, water, oil pipe-lines, grade-crossing eliminations, etc. Desire position as construction engineer with large contractor or as resident engineer and field representative for consulting engineers and architects. C-272.

Sales Manager or Assistant; Assoc. M. ASCE; graduate C.E.; 45; construction material or equipment; former Engineer officer; 20 years' experience in sales and promotion. Best of references. Location immaterial. Can produce anywhere. Employed at present in Midwest. Invite correspondence. C-273.

Civil Engineer; Jun. ASCE; 28; with selling personality and managing ability, desires permanent affiliation with small engineering or contracting firm in northern New Jersey whose "square" policies will encourage his loyalty; 4 years active field and office experience with responsible charge. C-274.

Civil Engineer; Jun. ASCE; graduate; 30; married; 5 years in Army Engineers; 2 years in New Guinea and the Philippines. Familiar with heavy equipment and earth moving. Desire permanent position in western part of United States. Would go to tropics if suitable living quarters were available. Available on approximately 2 weeks notice. C-275.

## POSITIONS AVAILABLE

Research Fellows to work half-time on industrial research programs and study half-time for M.S. or Ph.D. degree. Salary, $1,080 a year, plus exemption from tuition fees. Summer work available. Location, Pennsylvania. W-6249 (*c*).

Assistant Professor of civil engineering for responsible position in hydraulics and materials laboratory. Salary, $2,800–$3,000 a year. Location, Florida. W-6803.

Structural Engineers. (*a*) Structural Engineer Designer who has had experience on industrial buildings, steel, and concrete. (*b*) Structural Engineering Draftsman on industrial buildings. Above positions in Washington, D.C. (*c*) Engineering Designer, structural, who has had considerable experience on building work. Location, Connecticut. Salaries, to $6,760 a year. W-6831.

Architects and Architectural Engineers, with mechanical, electrical, sanitary, or structural experience. Government service. Salaries, $3,640–$5,180 a year. Location, Virginia. W-6835.

Construction Superintendent, 30–40, with considerable experience supervising lay out and erection of small home developments. Salary, $5,200 a year. Location, New York metropolitan area. W-6851.

Construction and Maintenance Manager, 35–45, with broad experience in design, construction, and maintenance of plants, to supervise new textile plant construction program and improvement of existing facilities. Salary, $10,000 a year. Location, New York, N.Y. W-6862.

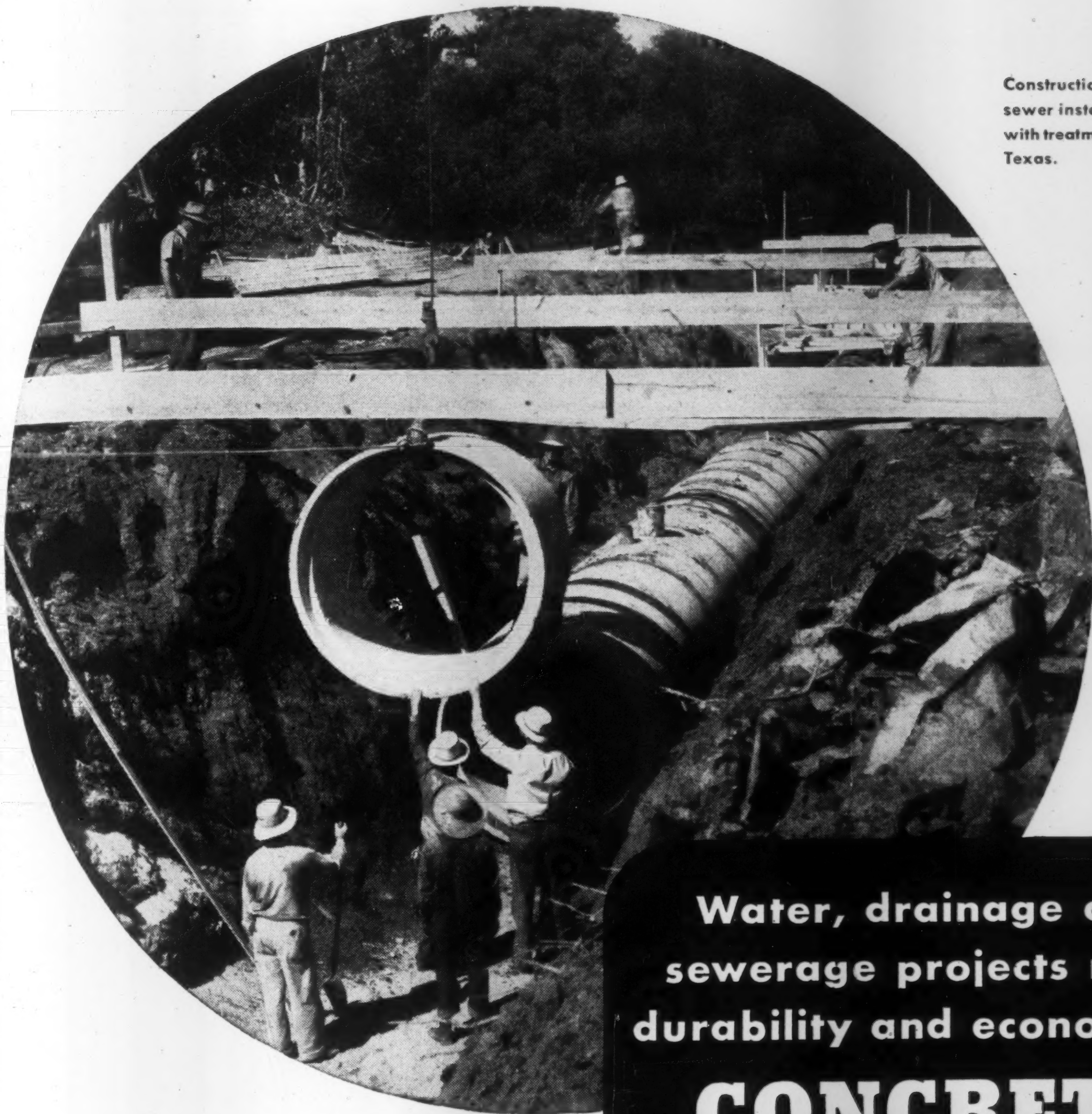
Assistant Division Engineers. (*a*) Mechanical. (*b*) Electrical. Should be capable of directing design and contacting clients for a consulting engineering firm. Must have design and installation experience in public utility or central station. Salaries, $5,500–$6,000 a year. Location, Connecticut. W-6871.

Civil Engineer with considerable experience in building construction, mainly from the office viewpoint, which means thorough knowledge of breaking down plans and handling subcontract work, for construction of a large factory project. Salary, approximately $5,200 a year. Location, upstate New York. W-6932.

Engineers, civil, electrical, mechanical, and architectural. Work involves designs and specifications for widely diversified structures and facilities that are to be constructed in a new reclamation program. Openings also in Hydrology Division, Project Planning Branch, and Power Utilization Branch. Government positions. Salaries, $2,320–$6,230 a year, plus overtime. Headquarters, Colorado. W-6967.

Instructor or Assistant Professor of Civil Engineering, to teach testing of materials, properties of materials, surveying, and perhaps some courses in structures; 11-month school year. Work to start September 30, 1946. Permanent. Location, northern Michigan. Salary for instructor $3,000 a year; assistant professor, $3,600, or possibly a little better depending upon experience. R-3332-C.

Draftsman-Engineer for design and construction of Boy Scout camp in an Eastern state. Land has been acquired and applicant must do drafting for about 12 months under guidance of part-time consulting engineers who serve without pay. Thereafter, will serve as field superintendent. Applicant should have college degree or equivalent experience and should have working knowledge of buildings, site development, and attendant utilities. Salary, $4,000 a year or more according to ability. Position will be open during May. W-7032.



**Construction view of concrete sewer installation connecting with treatment plant in Dallas, Texas.**

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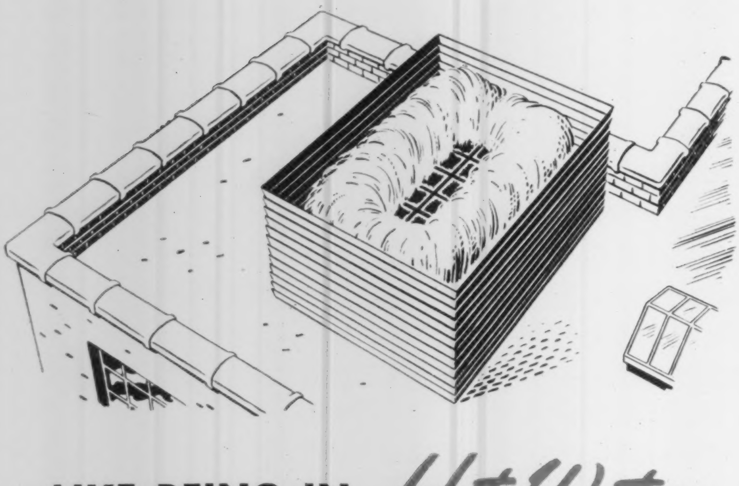

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*Abstracts of articles on civil engineering subjects from publications (except those of the American Society of Civil Engineers) in this country and foreign lands. The articles indexed are on file in the Engineering Societies Library, 29 West 39th Street, New York, N. Y. Photoprints will be supplied by this Library at the cost of reproduction, 25 cents per page to members of the Founder Societies (30 cents to all others), plus postage, or technical translations of the complete text may be obtained at cost.*

## BRIDGES

CONSTRUCTION, MILITARY ENGINEERING. Combat Battalion on Rhine, S. H. Grim. *Military Engr.*, vol. 37, no. 242, Dec. 1945, pp. 497–500. Role of 252d U.S. Army Engineers in construction of 400-ft bridge across Rhine, with data on equipment used, difficulties met, and lessons learned.

HIGHWAY, EMERGENCY TRAFFIC SERVICE. San Francisco-Oakland Bay Bridge Peak Traffic Creates Problems. *Calif. Highways & Pub. Works*, vol. 24, nos. 1 and 2, Jan.-Feb. 1946, pp. 21–22 and 36. There are serious difficulties during peak hours, not only due to heavy traffic in itself but also because of large number of vehicles stalled on bridge; 24-hour emergency service is maintained to serve vehicles in distress; Bay Bridge has continued to maintain low accident record.

HIGHWAY, MAINTENANCE AND REPAIR. Bridge Maintenance Practice on California Highway System, R. A. Wagner. *Calif. Highways & Pub. Works*, vol. 23, nos. 11 and 12, Nov.-Dec. 1945, pp. 12–16 and 33. More important maintenance problems are discussed; maintenance problems on timber trusses.

HIGHWAY, MANITOULIN ISLAND, CANADA. Highway Connection to Manitoulin Island. *Roads & Bridges*, vol. 84, no. 2, Feb. 1946, pp. 57–59, and 111–113. Illustrated description of highway replacing ferry which was only connection of Manitoulin Island at confluence of Lake Huron and Georgian Bay with mainland; former 300-ft railway swing bridge was transformed into combination railway and highway bridge; time of operating converted bridge was cut from 7½ to 3 min; data on new deck of bridge, signal system, cost, etc., presented.

HIGHWAY, NEWARK, N. J. New Bridge at Newark, S. G. Roberts. *Compressed Air Mag.*, vol. 51, no. 1, Jan. 1946, pp. 6–9. Brief description of planned vertical-lift Stickel Memorial Bridge over Passaic River between Newark and Harrison; towers are 207.5 ft above water and will raise span 100 ft above its normal position; crossing will have two 36-ft roadways, 4-ft central mall, and 6-ft sidewalks on each side; extensive use of compressed air in excavating for piers, removal of water in caissons, and otherwise facilitating subaqueous operations so far completed.

MILITARY. Standard Military Railway Bridges—6. *Ry. Gaz.*, vol. 84, no. 4, Jan. 25, 1945, pp. 95–98. Description of Everall sectional truss bridge, largest standard military bridge used by Allies; various forms and methods of erection, including that used at Deventer, Holland, dealt with.

STEEL TRUSS, CALIFORNIA. New Sacramento River Bridge at Rio Vista Built at Cost of $727,858, J. O. Jahlstrom. *Calif. Highway & Pub. Works*, vol. 24, nos. 1 and 2, Jan.-Feb. 1946, pp. 15–17. Illustrated description of steel-truss bridge over Sacramento River at Rio Vista, Calif.; bridge is replacement of former timber structure and consists of seven 180-ft steel trusses of Warren type on concrete piers with steel pile foundations; clear roadway width is 26 ft compared with 20 ft 8 in. on old bridge.

STEEL TRUSS, ILLINOIS. Illinois Central Overcomes Adverse Conditions on Cairo Bridge. *Ry. Eng. & Maintenance*, vol. 42, nos. 1 and 2, Jan. 1946, pp. 56–59 and 72, Feb., pp. 156–159. Similar description previously indexed from *Ry. Age*, Jan. 19, 1946.

WOODEN, STANDARDS. Report of Committee 7—Wood Bridges and Trestles. *Am. Ry. Eng. Assn.—Bul.*, vol. 47, no. 457, Jan. 1946, pp. 215–224. Specifications and design of fastenings for timber trestles, including metal joint connectors; proper procedure to be followed in renewing creosoted timber ballasted deck trestle; design of creosoted timber pile piers for long spans.

## BUILDINGS

HANGARS, PORTABLE. Simple Portable Hangar. *Engineer*, vol. 180, no. 4685, Oct. 26, 1945, pp. 331–332. Illustrated description of

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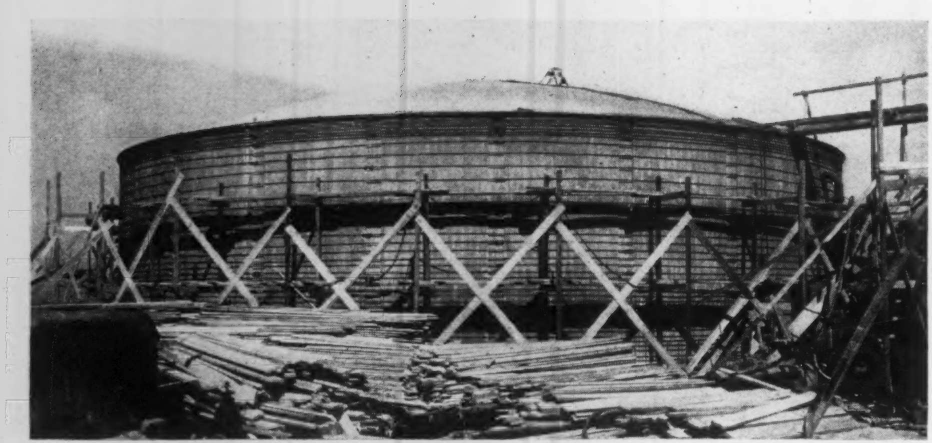

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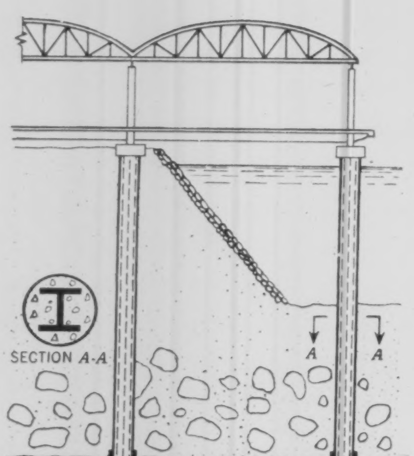

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## CITY AND REGIONAL PLANNING

EUROPE. Impoverished Europe Faces Slow Comeback, P. B. Fleming. *Eng. News-Rec.*, vol. 136, no. 6, Feb. 7, 1946, pp. 139–144. War damage conditions, reconstruction plans, projects, and difficulties in various European countries, including Russia, Norway, Denmark, Sweden, Belgium, Holland, Italy, and France; contemplated projects are rebuilding of Dnieper Dam and city of Stalingrad in Russia, and rubble removal, housing, railroads, port facilities, roads, and bridges in most of rest of Europe.

GREAT BRITAIN. Bombed Bristol Plans Brighter Future, H. M. Webb. *Eng. News-Rec.*, vol. 136, no. 6, Feb. 7, 1946, pp. 153–156. Reconstruction activities under way and in prospect for bomb-blasted Bristol are described, and diagrams showing damage and planned improvements of central area comprising about 800 acres.

GREAT BRITAIN. Coventry Tentative Planning and Redevelopment Proposals, E. H. Ford. *Instn. of Mun. & County Engrs.—J.*, vol. 72, no. 7, Feb. 5, 1946, pp. 267–281, (discussion) 282. Rebuilding of Coventry, England, studied by means of surveys concerning traffic, housing, industry, coordination of road and rail transport, open spaces, green belts, airports, etc.; illustrations.

GREAT BRITAIN. Municipal Estate Development. C. R. Hutchinson. *Surveyor*, vol. 105, no. 2818, Jan. 25, 1946, pp. 59–60. Official of Solihull Urban District Council, Great Britain, gives recommendations for house plans, standardization measures, materials, access roads to estates, city planning, footpaths, and constructional details. Before Instn. Mun. & County Engrs., Birmingham.

MANILA, P. I. Rehabilitation of Ruined Manila, H. W. Richardson. *Eng. News-Rec.*, vol. 136, no. 6, Feb. 7, 1946, pp. 157–162. Article describes U.S. Army Engineers' work of emergency repair in Manila, which involved restoration of bridges, water distribution, and sewer systems, power lines, port and waterfront facilities, and provision of lumber and other material supplies; note on city's future plans included.

POSTWAR, UNITED STATES. Post-War Patterns of City Growth in U.S.A., H. M. Lewis. *Passenger Transport J.*, vol. 94, no. 2375, Jan. 11, 1946, pp. 24–30. Discussion of features, formulation procedures, and use of master plan for physical development of communities; object of plan is to promote balanced growth of city's framework, and to determine general location and extent of public transit utilities and terminals; article is confined to master plan application to city transit problems and development. Reprinted from Am. Transit Assn. "Convention-in-Print."

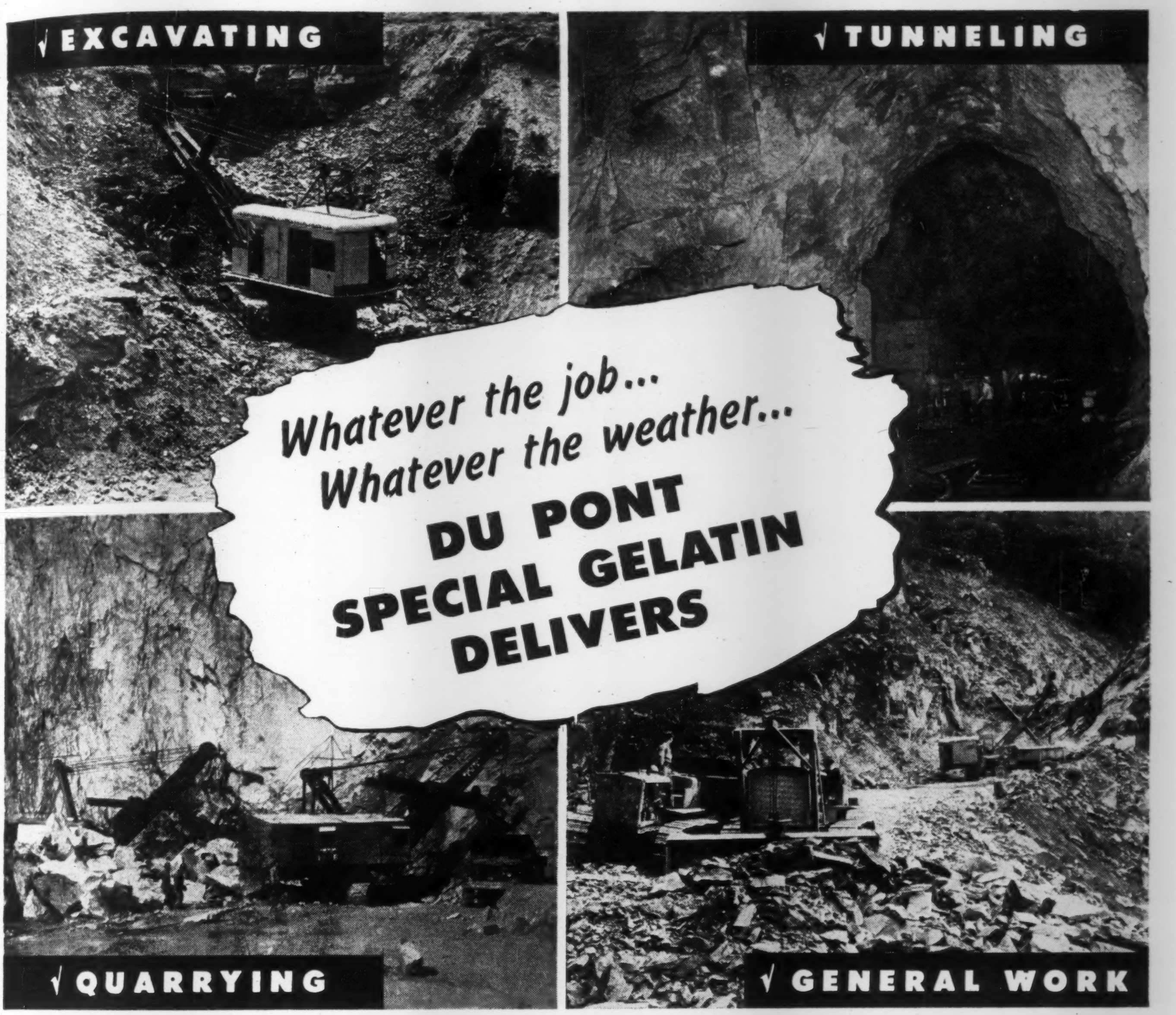
RELATION TO PUBLIC. More Realism Is Needed in Town Planning, B. England. *Bus. & Coach*, vol. 18, no. 205, Jan. 1946, pp. 8-11. Author emphasizes necessity for realistic planning by discussing effects on public and general business, of restricted traffic zoning and curtailment of public transport operations within city squares, hub areas and certain congested districts; traffic flow improvement method explained.

## CONCRETE

AGGREGATES, OREGON. Notes on Building-Block Materials of Eastern Oregon, N. S. Wagner. *Oregon Dept. Geology & Mineral Industries—Bul. No. 14*, 6 pp., 10 cents. Advantages of light-weight aggregates for concrete building blocks; three types of materials potentially suitable for aggregates have been found in Baker area; volcanic tuff which makes very light gray and light-weight block; volcanic cinders, both red and black; diatomaceous earth; fabrication of test blocks; tests for absorption and crushing strength; discussion of test results and of market area; equipment required.

AIRPORT RUNWAYS. Durability of Concrete at Airfield. *Eng. News-Rec.*, vol. 136, no. 8, Feb. 21, 1946, pp. 292–293. Three severe winters and use of calcium and sodium chloride de-icing agents have not impaired paved concrete runways at Bunker Hill Naval Air Station near Peru, Ind.; durability attributed to use of Pozzolith cement-dispersing admixture at rate of 1 lb per bag of cement; details of mix and pavement maintenance given.

BUNKERS. Deterioration of Concrete Ash-Receiving and Storage Bunkers, T. H. Carr. *Instn. Civ. Engrs.—J.*, vol. 25, no. 4, Feb. 1946, pp. 275–280. Study of causes of deterioration of inside walls of ash bunkers where ash and water were in contact with concrete; experiments revealed that water became alkaline; tests were also made to determine resistance of certain type of tiles; results showed that latter were more resistant to attack by acid solution than ordinary concrete; hoppers, therefore, were lined with those tiles; they proved satisfactory after 5-year service.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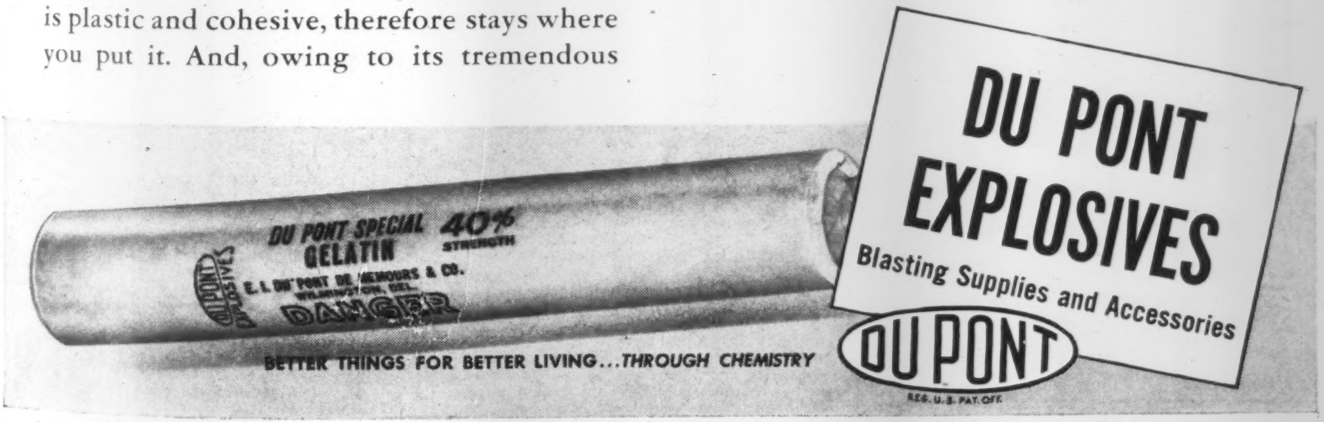
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DAMS

Earth, Design. Moderne Spaerredaemninger af Jord og Sten, J. Christensen. *Ingenioren*, vol. 54, no. 34, Nov. 10, 1945, pp. 101–114. Modern earth and stone dams are described and illustrated; examples from Europe and United States showing various cross sections; methods of securing stability in case of undermining or overflowing discussed; arrangement of various types of dam cores and slope reinforcement explained. Before Danish Soc. Civ. Engrs.

Foundations. Influence of Geology on Construction of Impounding Dams, E. Morton. *Water & Water Eng.*, vol. 49, no. 599, Feb. 1946, pp. 71–73. Geological conditions of superficial deposits and underlying solid rocks discussed as far as they influence measures to be taken to secure stability and water-tightness of dams; successful diagnosis of geological conditions on reservoir site involves detailed geological survey and sinking of trial boreholes. Bibliography. Before Northern Section of Instn. of Water Engrs.

Foundations. Physical Properties of Foundation Rock at Proposed Dam Site at Maraetai. on Waikato River, C. L. Maloy and A. D. Lowe, *New Zealand J. Science & Technology* (B. Gen. Sec.), vol. 27, no. 2, Sept. 1945, pp. 77–111, supp. plate. Tests were made at various depths in both banks for physical properties, such as specific gravity, water absorption, water permeability, compressive strength, shear strength, modulus of rupture, Young's modulus of elasticity in compression, and in flexure; wet rock showed marked decrease in strength and elastic moduli.

Reservoirs, Cleaning. Cleaning Reservoirs in Toronto. *Water & Sewage*, vol. 84, no. 1, Jan. 1946, pp. 13–14 and 42. Illustrated description of procedure in inspecting, flushing, and repairing of St. Clair 50-mg. closed reservoir and Rosehill 30-mg. open reservoir in Toronto; former is of reinforced concrete covered with earth and divided into two chambers, each with capacity of 25 million gal; latter has concrete bottom and side walls of concrete and gravel.

Spillways, Erosion. Maintenance of Spillway Bucket of Grand Coulee Dam. *Engineer*, vol. 180, no. 4684, Oct. 19, 1945, pp. 300–302. Illustrated description of caisson being made to facilitate maintenance of spillway bucket of dam on Columbia River.

FLOOD CONTROL

Central Valley Project. Shasta Reservoir Operated for Flood Control. *Calif. Highways & Pub. Works*, vol. 24, nos. 1 and 2, Jan.–Feb. 1946, pp. 6 and 36. Data reveal that Shasta reservoir, major unit of Central Valley Project, California, is proving its effectiveness in control of floods on Sacramento River; illustration shows flood control valves in operation.

Roads and Streets. Protecting Highways from Damage by Floods. *Pub. Works*, vol. 77, no. 2, Feb. 1946, pp. 29–30. Illustrated description of use of permeable pile jetties to divert stream from point where flood water might damage or wash away highway; other methods are also discussed and actual samples presented.

FOUNDATIONS

Excavation, Accident Prevention. Advantages of Steel Sheeting for Use in Trench Excavation, W. T. Adams. *Pub. Works*, vol. 77, no. 2, Feb. 1946, pp. 17–18. Illustrated report shows advantages of steel sheeting as to safety economy, and practicability.

Soils, Mechanics. Earth Pressure and Earth Resistance, S. Packshaw. *Instn. Engrs.—J.*, vol. 25, no. 4, Feb. 1946, pp. 233–256. Paper refers both to classical earth pressure theories (Coulomb, Rankine) and recent studies (Krey, Terzaghl, etc.); it deals with wall friction and adhesion, cohesionless and cohesive soils, distribution of earth pressure and its graphical determination, earth resistance, etc.; explanations are supported by charts and diagrams. Bibliography.

LAND RECLAMATION AND DRAINAGE

Rivers, Improvement. Initial Missouri River Basin Construction Ready to Start. *Constructor*, vol. 27, no. 12, Dec. 1945, pp. 39–41. Some features of Missouri River Basin program are described, including appropriations, surveys, planned dams, levees, bank protection, reservoirs, power lines, and other improvements; map is included showing location of projects.

MATERIALS TESTING

Concrete. Mobile Laboratory for Testing Concrete. *Cement & Lime Mfr.*, vol. 19, no. 1, Jan. 1946, pp. 9–11. Illustrated description of mobile laboratory in use by Road Research Laboratory of Dept. of Sci. & Indus. Research, Great Britain; it is mounted on 6-ton four-wheel trailer chassis and equipped with hand-operated 100-ton hydraulic compression-testing machine, standard mortar-cube vibrator, electric sieve-shaker, scales, etc.

Concrete Aggregates. Examination and Testing of Concrete Materials, L. A. Thorssen. *Roads & Bridges*, vol. 84, no. 2, Feb. 1946, pp. 67 and 102–108. Following problems are dealt with in tests described with aid of illustrations: Specific gravity and absorption, surface moisture, voids in aggregates, organic impurities, structural strength of fine aggregate, sieve analysis,

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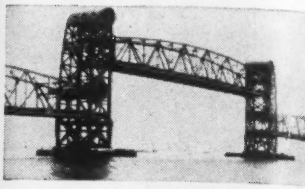

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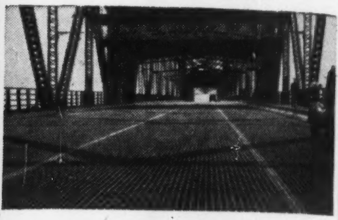

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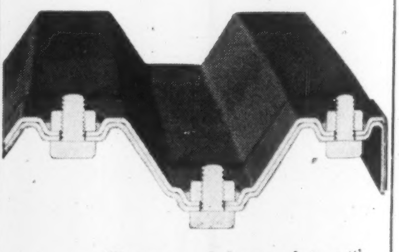

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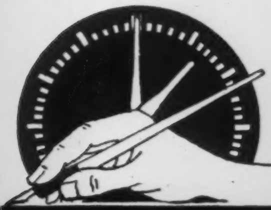

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## SANITARY ENGINEERING

**GREAT BRITAIN.** Some Foibles of Sanitary Engineering, L. B. Escritt. *Surveyor*, vol. 105, no. 2818, Jan. 25, 1946, pp. 63–64. Discussion of most noticeable imperfections of design of drainage, sewage treatment, etc.; recommendations of Royal Commission on Sewage Disposal and other British Authorities given for improvement of conditions. Before Roy, Sanitary Inst., London.

## SEWERAGE AND SEWAGE DISPOSAL

**CAMPS, MILITARY.** Review of Some Army Sewage Treatment Problems and Results. *Pub. Works*, vol. 76, no. 12, Dec. 1945, pp. 24–25 and 28. Various problems were presented by 400 treatment plants at military installations; filter fly nuisance, overloading, dangers in use of sludge, and many others; committee of sanitary engineers is preparing report on design and operation of these plants.

**SEWAGE PUMPING PLANTS.** Design and Operation of Sewage Pumping Stations, W. S. Lea. *Water & Sewage*, vol. 83, no. 11, Nov. 1945, pp. 56, 72, 74, 76, and 78. Problems of design and operation of pumps and piping in plant serving population of 25,000 or less; combined sewerage system; flow distribution discussed; operators in attendance. Before Can. Inst. Sewage & Sanitation.

**SEWERS, CONSTRUCTION.** Excavation in Difficult Ground, R. Glossop and H. Q. Golder. *Surveyor*, vol. 104, no. 2811, Dec. 7, 1945, pp. 753–756. Problems of estimation of pressure on trench timbering in construction of deep sewer and geo-technical processes that can be used to assist in excavation. Before Instn. Sanitary Engrs.

**SEWERS, DESIGN.** Surface Water Sewer Design, G. S. Short. *Instn. Mun. & County Engrs.—J.*, vol. 72, no. 6, Jan. 1, 1946, pp. 241–246, (discussion) 246–251. Choice of typical storm or rainfall intensity curve, determination of factors governing area under consideration, method of design, and choice of sizes of pipes; suggestions for practical code containing standard method of design; tables or curves giving discharges and velocities of flow in pipes and channels at various gradients and of various materials.

**SEWERS, MAINTENANCE AND REPAIR.** Repairing Sewer Laid in Quicksand, R. G. Coulter. *Pub. Works*, vol. 76, no. 12, Dec. 1945, pp. 19–20. 21-in. sewer, laid in sand with ground-water level 5 ft above invert, had settled maximum distance of 3.25 ft and was badly cracked; reconstruction necessitated use of well points for dewatering trench.

**SLUDGE DISPOSAL.** Incineration of Sludge Meets Detroit Conditions, L. V. Garrity. *Water & Sewage*, vol. 83, no. 11, Nov. 1945, pp. 53, 84, and 86. Discussion of suitability of elutriation process for Detroit conditions, and research in use of incinerator ash as raw material for manufacture of portland cement; elutriation found to increase operating costs; sludge not suitable as fertilizer.

**SLUDGE DISPOSAL.** Sludge Disposal at Detroit, C. W. Hubbell. *Water & Sewage*, vol. 83, no. 11, Nov. 1945, pp. 51–52, 90, and 92. Description of plant, and process of incineration used for sludge disposal; plant is designed for ultimate population of 4,000,000 and estimated average flow of 175 gal per capita per day; treatment consists of plain sedimentation, sludge incineration, and chlorination of effluent. Before Can. Inst. on Sewage & Sanitation.

**TREATMENT PLANTS, DESIGN.** Internment Camp Treats Sewage in Ten Lagoons, W. W. Blackstone. *Sewage Works Eng. & Mun. Sanitation*, vol. 17, no. 1, Jan. 1946, pp. 14–15. Illustrated description of original and present layout of settling and clarifying lagoons; data on operation of plant and on results of biological tests given; problems of odor, algae growth, and mosquitoes discussed.

**TREATMENT PLANTS, DETROIT, MICH.** Sludge Disposal Practices, C. W. Hubbell. *Surveyor*, vol. 105, no. 2818, Jan. 25, 1946, p. 67. Brief report on methods practiced in connection with sludge-disposal problem; sewage treatment plant is designed for ultimate population of 4,000,000 and estimated average flow of 175 gal per day; treatment consists essentially of plain sedimentation, sludge incineration, and chlorination of effluent; data on experimental digestion tank and elutriation tank presented. Before Can. Inst. Sewage & Sanitation.

**TREATMENT PLANTS, HAMPTON ROADS, VA.** Sanitary District Looks Forward. *Am. City*, vol. 61, no. 1, Jan. 1946, pp. 101, 103, and 127. Discussion of projected sewage disposal facilities for Hampton Roads Sanitary District to serve upwards of 400,000, and handle nearly 41 mgd by 1950; general layout of treatment plant at Norfolk, Va.

## STRUCTURAL ENGINEERING

**BEAMS AND GIRDERS, DEFLECTION.** Simple Tabular Method of Calculating Deflections and Influence Coefficients of Beams, N. O. Myklestad. *J. Aeronautical Sciences*, vol. 13, no. 1, Jan. 1946,

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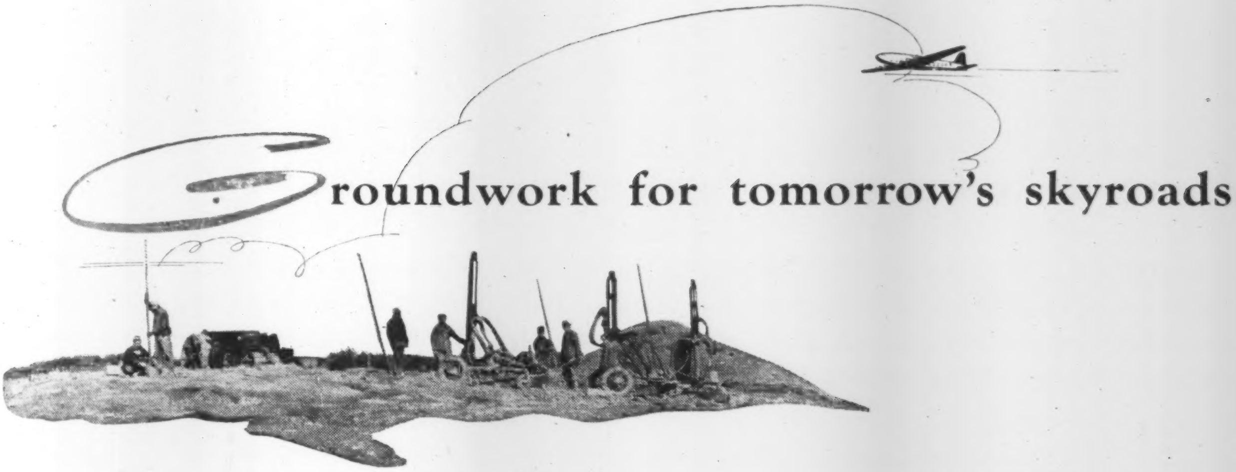

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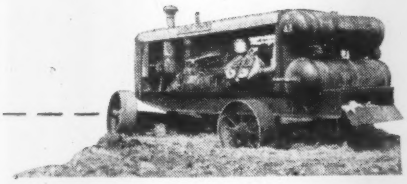

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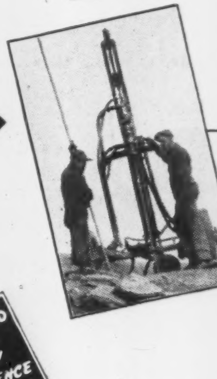

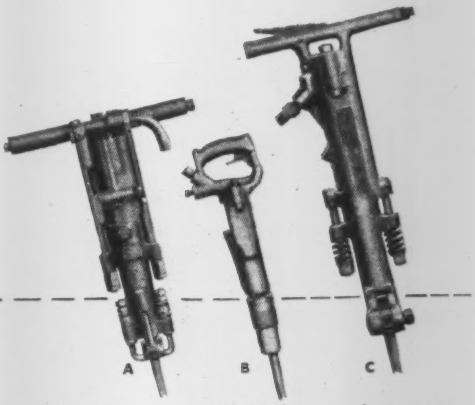

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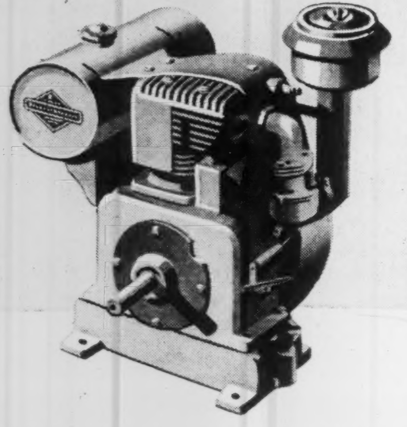

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pp. 23–28. Method of finding deflection curves and influence coefficients is easily applied to cantilever beams and to simple beams with or without overhangs; calculations can be performed in routine manner by computer who knows nothing about beam theory; method assumes that beam itself is weightless and carries finite number of concentrated forces.

### TRAFFIC CONTROL

HIGHWAY IMPROVEMENT NEEDED. Urban Highway Improvement Is Urgent Need, H. A. MacDonald. *Roads & Bridges*, vol. 83, no. 12, Dec. 1945, pp. 69–70, and 99–103. Notes on correct use of traffic data in highway planning and design; necessity of planning urban highways to handle increased traffic.

### TUNNELS

MILITARY ENGINEERING. Tunnelling in Gibraltar during 1939–1945 War, W. H. Wilson. *Inst. Min. & Met.—Bul.*, no. 475, Nov. 1945, 33 pp., supp. plates. Account of methods and machinery used in driving tunnel and of diamond drill blasting in excavation of big chambers.

MINES AND MINING. Utah Copper Company Builds Railroad Tunnel, A. S. Crowley. *Explosives Engr.*, vol. 23, no. 5, Sept.–Oct. 1945, pp. 195–197. Illustrations and technical details of railroad tunnel for copper mine at Bingham, Utah; almost 80% of 4,646-ft length has concrete lining, remaining length wooden lining; electrical and mechanical equipment for excavation, concrete pouring, etc., described.

SUBAQUEOUS. Emergency Repairs to Under-River Subway, H. B. Harding. *Surveyor*, vol. 105, no. 2818, Jan. 25, 1946, p. 64. Discussion of problems encountered in 1940 when bomb fell into Thames River near Tower subway tunnel without penetrating it but cracking iron lining, thus requiring repair; methods adopted and behavior of surrounding clay described.

VEHICULAR. Traffic Conditions Improved in Montreal Tunnel, H. A. Gibeau. *Roads & Bridges*, vol. 83, no. 12, Dec. 1945, pp. 59 and 90. Wellington highway and street railroad tunnel under Lachine Canal has difference in elevation between two levels which creates drainage problem; ground drains were installed along walls on each side of roadway, granite paving blocks used to reduce noise, and special paint applied to tunnel walls to increase lighting effects.

WATER SUPPLY, COLORADO. Lining Continental Divide Tunnel. *Concrete*, vol. 53, no. 12, Dec. 1945, pp. 10–13 and 36. Some general features of U.S. Bureau of Reclamation's Colorado-Big Thompson Project, with special reference to progress in concrete lining of longest tunnel in this country driven from two headings; supply, handling, and placing of concrete materials.

### WATER PIPE LINES

CONCRETE. Concrete Pipe on Salt Lake Aqueduct, L. R. Dunkley. *Concrete*, vol. 54, no. 1, Jan. 1946, pp. 10–13 and 24. Illustrated description of $10^{1}/_{2}$ miles of 69-in. diameter precast concrete pipe line of U.S. Bureau of Reclamation's Provo River Project, Utah; data given on general history of aqueduct, materials control, casting and curing, hauling, handling, and jointing.

### WATER RESOURCES

BOSTON, MASS. Water Supply Developments in Boston, Massachusetts, K. R. Kennison. *Surveyor*, vol. 105, no. 2815, Jan. 4, 1946, p. 13. Description of development of district organization, founded for adequate sewerage and better water supply for Boston, and its suburbs within radius of 10 miles from State House; brief technical data on pumping stations, reservoirs, aqueducts, etc.; reference made to engineering organization for design and construction of water works of New York City. Before Instn. Water Engrs.

COLD WEATHER PROBLEMS. Winter Precautions at Regina, Saskatchewan, J. W. D. Farrell. *Water Works Eng.*, vol. 98, no. 26, Dec. 26, 1945, pp. 1501 and 1520. Precautions taken to prevent freezing are described; $7^{1}/_{2}$-ft coverage of mains prevents freezing; water meters equipped with breakable frost bottom; reservoir ice troubles; tools for breaking frozen ground.

CRYSTAL CITY, MO. High Iron Content in Water of Crystal City, Mo., W. Wheatly. *Pub. Works*, vol. 77, no. 1, Jan. 1946, pp. 36 and 38. Increasing demand for water at Crystal City, caused by change in production of plate glass there, could not be supplied by existing wells; illustrated description and technical details given of new Ranney well, 80 ft deep, built to bed rock; feeder pipes project horizontally from bottom of well; data given on filtration plant for drinking water, storage basin, and distribution system for glass plant.

INDUSTRIAL PLANTS. Industry Converts Sewage Works Effluent Into Water Supply, W. P. Hill. *Water Works & Sewerage*, vol. 92, no. 12, Dec. 1945, pp. 383–387. Rapid expansion of industry at Baltimore, Md., made necessary new sources of water; effluent from the city sewage disposal plant was selected as being most promising; article describes purification plant for converting sewage effluents, supply conduit, pumping station and precautions for safety; system,

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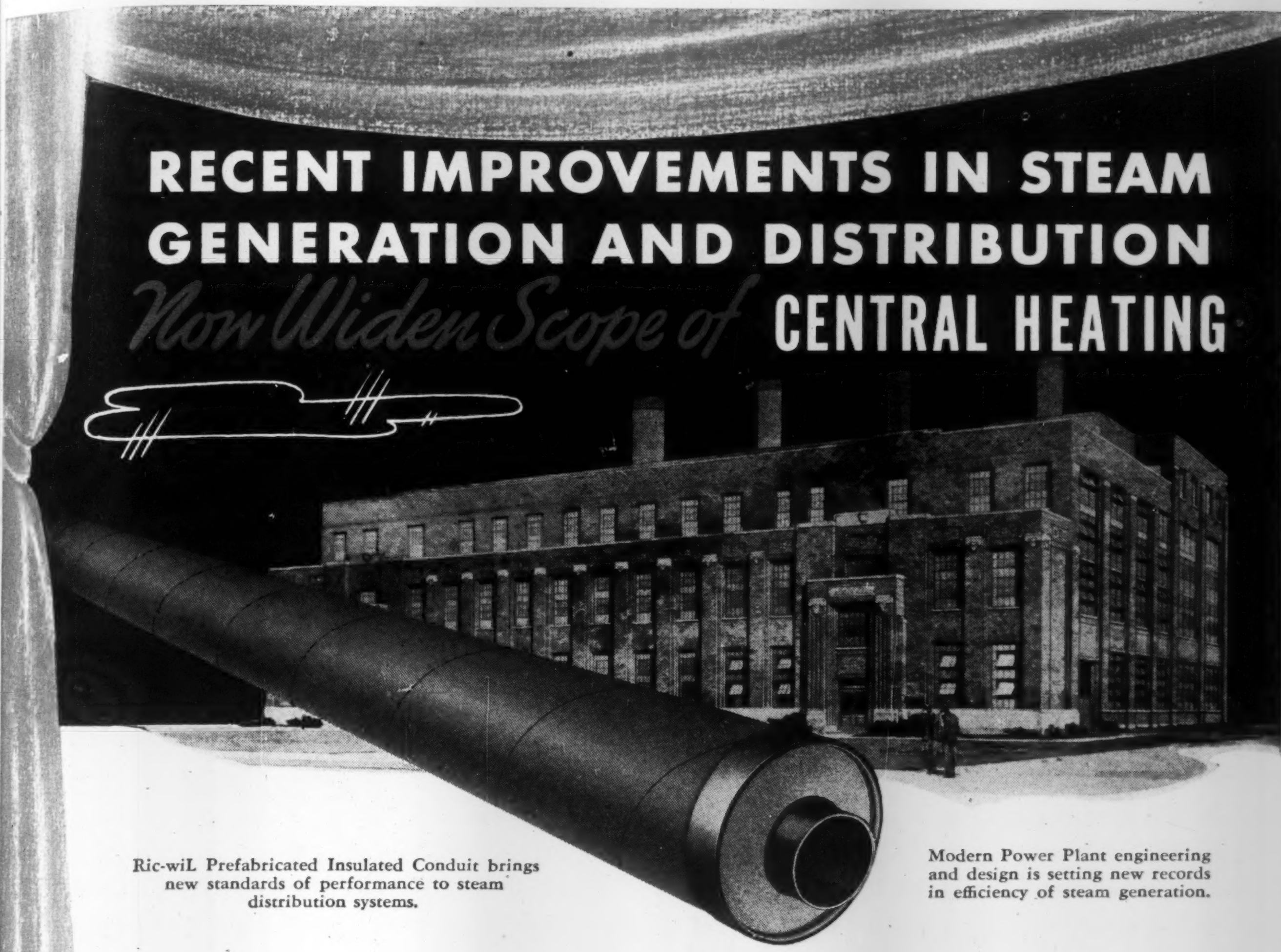

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MAINTENANCE AND REPAIR. Maintenance Problems, A. A. Ulrich. *Am. Water Works Assn.—J.*, vol. 37; no. 12, Dec. 1945, pp. 1300–1304. Description of maintenance problems encountered at Massillon, Ohio; rehabilitation of gravel well; installation of glazed tile in carbonating basin; maintenance of filters, pumps, meters, valves, hydrants, and appurtenances.

### WATER TREATMENT

CHLORINATION. Breakpoint Chlorination of Military Water Supplies in Fourth Service Command. *Pub. Works*, vol. 77, no. 2, Feb. 1946, pp. 19–20. "Breakpoint" chlorination completely oxidizes ammonia content, and permits maintenance of free chlorine residual; report on bacteriological results at five Army stations in Southeastern states.

COAGULATION. Coagulation and Benefits from Good Floc Formation, R. W. Ockershausen. *Am. Water Works Assn.—J.*, vol. 37, no. 12, Dec. 1945, pp. 1305–1309. Practical problems involved in use of coagulants; difference between precipitation and coagulation; turbidity removal; marginal coagulant doses; reduction of microscopic organisms; taste and odor reduction; determining dose for good floc production.

FILTRATION. Prechlorinating Delaware River Water Aids Filtration, M. J. McLaughlin. *Water Works Eng.*, vol. 98, no. 26, Dec. 26, 1945, pp. 1492–1494. Pre-chlorination installed at Torresdale plant, Philadelphia, in order to overcome difficulties of constantly increasing load; advantages of method; description of units.

FILTRATION PLANTS, CHICAGO, ILL. World's Largest Water Filtration Works Placed in Operation at Chicago, J. W. Beatty. *Int. Engr.*, vol. 89, no. 1, Jan. 1946, pp. 8–11. Description of filtration plant designed to treat more than 320 mgd; architectural design; plant layout; water flow through plant; filtering facilities; chemical treatment of water; control of chemical treatment.

FILTRATION PLANTS, MARTINVILLE, LA. Filter Capacity Restored by Replacing Down-Drop Pipe, A. A. Hirsch. *Water Works Eng.*, vol. 99, no. 4, Feb. 20, 1946, pp. 184–185. Cause of decreasing efficiency filter at St. Martinville, La., was corroded effluent drop pipe; relatively short section of 4-in. pipe was renewed, and plant operation has been restored to normal; details of filter and its piping are shown in sketch.

FILTRATION PLANTS, RIPLEY, W.Va. Putting Small Filter Plant Back on Its Feet, R. B. Parsons. *Am. Water Works Assn.—J.*, vol. 38, no. 2, Feb. 1946, pp. 223–226. Description of alterations to filtration plant with capacity of 150 gal per min at Ripley, W.Va., in order to reestablish efficient operation; by removing sludge, gravel, and sand from laterals and by grading gravel, and replacing sand, plant capacity was improved from 4,500 to 8,000 gal per hour and average monthly expenses decreased from $559 to $481.

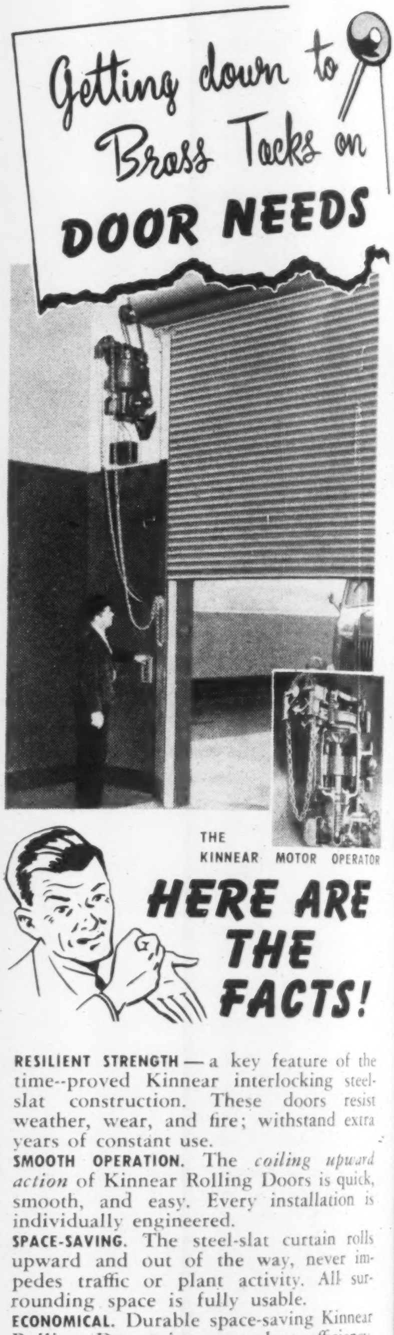
RESERVOIRS, ALGAE CONTROL. Algae Control in Reservoirs of San Francisco System, H. C. Medbery. *Water Works Eng.*, vol. 99, no. 1, Jan. 9, 1946, pp. 14–16. Report on special methods worked out by San Francisco Water Dept. to determine when reservoirs should be treated and amount of copper sulfate to be applied; treatment varies from 12 lb per acre in shallow sections up to 32 lb per acre in deep section; better algae control attained as revealed after 2$^1/_2$ years of experience.

TASTE AND ODOR CONTROL. Elimination of Tastes and Odors from Army Post Water Supply, F. H. Stover. *Pub. Works*, vol. 76, no. 12, Dec. 1945, pp. 30 and 32. At Army Post in Arizona, algae in reservoir, killed by copper sulfate, had settled to bottom to form black mud, decomposition of which caused serious taste and odor problem; temporary and permanent remedies are described.

TREATMENT PLANTS, LONGVIEW, WASH. "Pure, Sparkling, Mountain Water"—Rejected, A. H. Labsap. *Am. City*, vol. 61, no. 1, Jan. 1946, pp. 74–76. Problems met and operating features of modern coagulation and filtration water-supply plant of 4-mgd capacity, constructed at Longview, Wash.

TROPICS. Purification at Tropical Water Supply, J. S. Dunn. *Water & Water Eng.*, vol. 48, no. 596, Dec. 1945, pp. 659–669. Description of methods used at Weija waterworks of Accra, Gold Coast, Africa; source of supply is river Densu, which is infested with crocodiles, mixed with swamp water in wet season, and requires high doses of aluminum sulfate for purification.

WATER ANALYSIS, HYDROGEN ION CONCENTRATION. Effect of Temperature on pH of Natural Waters, W. F. Langelier. *Am. Water Works Assn.—J.*, vol. 38, no. 2, Feb. 1946, pp. 179–185. Charts for conversion of room temperature pH measurements of dilute carbonate solutions into values at other temperatures; data intended for use in water softening and water pipe incrustation calculations; validity of data, as listed in table and plotted in charts, presented.



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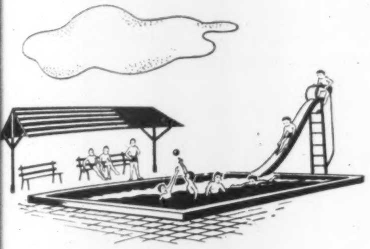

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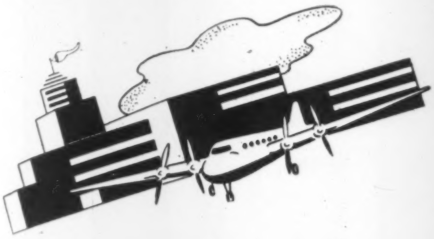

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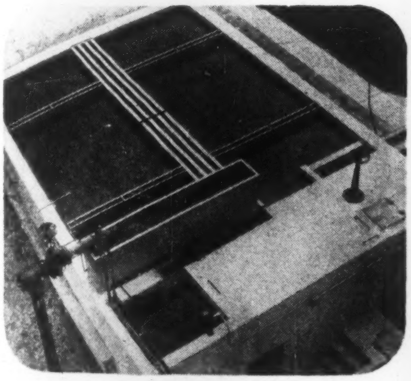

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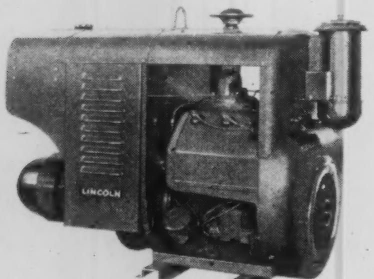
## Low-Priced Lincoln Welder

A new inexpensive portable welder of the gasoline engine-driven type is announced by The Lincoln Electric Company, Cleveland, Ohio. Of particular value for welding applications in areas where electric power is not readily available, this 200-amp welder known as the "Shield-Arc, Jr.," is compact in design, measuring 24 by 48 by 30 in. and weighing 660 lb.



With a current range of from 40 to 250 amp, the machine can be used for the welding of light or heavy gage metal, for the repair of cast-iron structures, for the construction of various contrivances or the repair or fabrication of tools and machinery parts, and for hard facing of worn parts.

This welder has many new features: (1) Provision is made on the output panel for three ranges of output current, with continuous adjustment within these ranges by means of a simple speed control. (2) Generator controls are mounted inside an enclosed cabinet above the generator, cooling being through a fan mounted on the generator shaft. (3) The welder is powered by a Wisconsin air-cooled 4-cylinder V-type engine. The speed of the engine determines the welding current. Equipped with a 6-gallon capacity gasoline tank, the unit will operate under normal welding conditions for approximately six hours before refueling. (4) Two transverse mounting rails for bolting to floor or platform permit the welder to be mounted on either shop trailer or high-speed road type two-wheel trailer.

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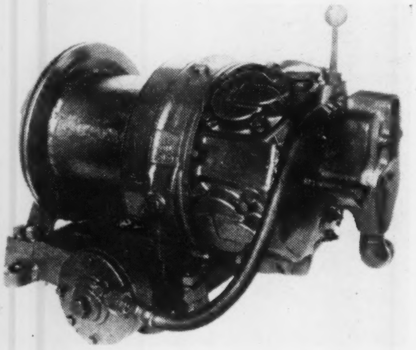

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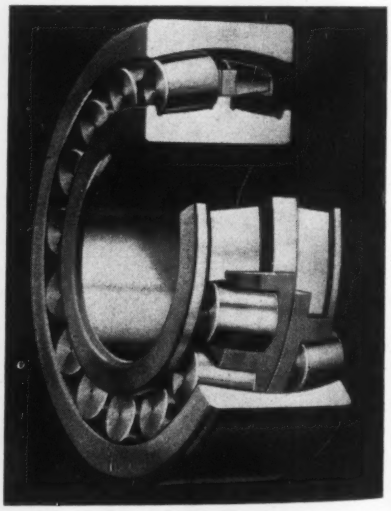
The new engine—the "FV"—is built to furnish power for locomotives, shallow-draft river boats, draglines, dredges, excavators, and various other stationary and industrial applications. It is a four-cycle engine with a 9-in. bore and a $10^1/_2$-in. stroke and is being built in 12 and 16-cylinder models. Among its distinctive details of design are a four-valve head, a one-piece cylinder and head assembly, and a geared accessory drive which is enclosed in the main frame. These new Cooper-Bessemer engine features, added to many other engineering advancements, make the "FV" particularly suitable for numerous stationary and industrial power service as well as for direct-reversing marine use. Complete descriptive literature will be supplied by the manufacturer.

## Rate of Flow Gauge

Flo-Gage—a simple, inexpensive flow indicator has just been announced by Builders-Providence, Inc. (Division of Builders Iron Foundry), 20 Codding St., Providence, R.I. This midget differential meter indicates rate of flow of liquids and gases through lines containing Orifices, Venturi Tubes, and Insert Nozzles as differential producers and also indicates liquid level and pressure differences. It is said to be particularly useful as an operating guide in manually adjusting valve positions at the start of a cycle of operations as well as in providing continuous information of flow rates so that efficient operation may be maintained throughout the complete cycle. Features of the new Builders Flo-Gage are its simplicity, accuracy, legibility, sensitivity, and low cost. The gauge has no stuffing box and requires a minimum of maintenance. It can be furnished to measure such units as gallons per minute, cubic feet per hour, etc., and indicates rate of flow within 2% of full scale. Bulletin 360 describes.

## Spherical Roller Bearing

To fulfill a widespread need in many industries, the Bantam Bearings Division of the Torrington Company, South Bend 21, Ind., announces the production of a self-aligning spherical roller bearing. This is a new addition to their line of anti-friction bearings, which includes straight roller, tapered roller, needle and ball.



This new spherical roller bearing is specifically adaptable to heavy-duty performance in a wide range of equipment. In addition to the self-aligning feature, this new Torrington bearing offers two-directional thrust, high radial capacity, high thrust capacity, and unit construction for easy installation. The bearing will be produced in a full range of sizes from 1.5748-in. bore upward. Bulletin 100A.

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DRY MATERIALS

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22′ diameter con-
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estone bins, for
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pany, Akron, Ohio

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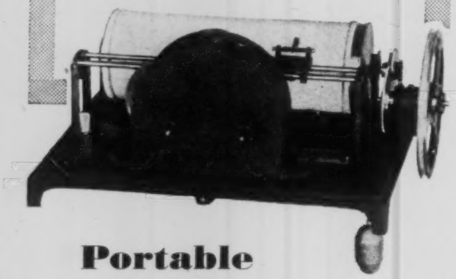
WATER LEVEL
RECORDER
*Type F*



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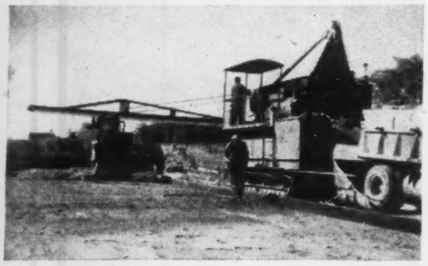
## Hydraulic Slide Rule

IN DESIGNING the slide rule—Hydraulics of Pipe Culverts—Dr. F. T. Mavis has assembled, for mechanical computation, the several variable factors required to design short pipe lines or culverts to discharge water through highway and railroad fills. The hydraulic properties of culverts, ranging in diameter from 18 to 96 in., constructed on slopes from 0.01 to 4.0 per cent, can be easily determined. This is reported to be the first time this complicated subject has been presented in such a simple manner as to be helpful to practicing engineers charged with the design and construction of culverts for highways and railroads.

The rule measuring $10^1/_8$ in. by $3^1/_4$ in. is constructed of a varnished bristol board. It has been put on the market by Mr. M. J. Loving, Consulting Engineer, 228 N. La Salle St., Chicago 1, Ill., and may also be obtained from many manufacturers of concrete pipe.

## New 34-E Dual Drum Paver

AFTER EXHAUSTIVE field tests, the Foote Company, Inc., Nunda, N.Y., has announced the Multi-Foote Duomix, a 34-E dual-drum paver. Fully automatic control is reported to cut down charging, transfer, and discharging time to a minimum. On one pilot test which involved paving of a six-mile reconstruction project, the paver turned out 10% oversize batches (37.4 cu ft) every 35 seconds. Whenever enough batch trucks were available, runs ranging from 60 to 80 batches an hour were made despite the necessity of moving the paver back and forth in order to put on a final 3-in. top course after placing reinforcement.



The Multi-Foote Duomix traveling mechanism is driven from the single main shaft, which also provides power for the drums and skip hoist. Drive gears are fully enclosed and run in oil. There are two speeds, forward and reverse. A new type of tread plate prevents stones from lodging in the joints between treads. In addition, drive lugs are on alternate sides of adjacent treads, providing a clean, smooth path and distributing the bearing pressure evenly, regardless of ground conditions.

Transfer and discharge chutes are rotary type, requiring only a quarter turn from completely shut to wide open positions. Drums are both of the Multi-Foote Double-Cone design which has proved highly satisfactory on single-drum Multi-Foote 27-E's and 34-E's.

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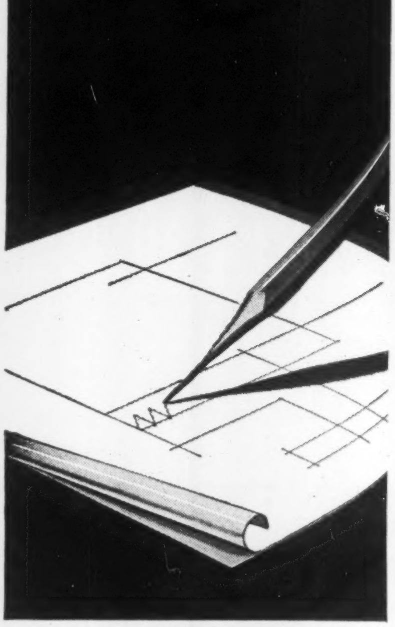

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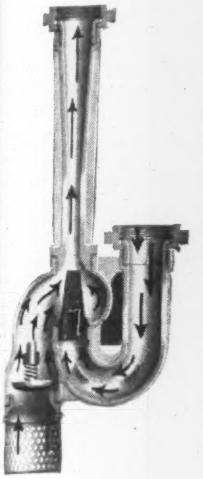
## Lifts Water 100 Feet

A new pump booster is announced which makes available heretofore inaccessible water supplies for fire fighting and permits water drainage from pits or cellars beyond reach of standard pumping equipment. Using standard fire-pumping equipment or its equivalent, the Accel-O-Rate Pump Booster will lift water vertically 100 ft or more, and will draft water for distances of 200 to 300 ft from water sources impossible to reach because of gulleys, ditches, mud, or other obstacles.



Employing the jet pump principle, this unit has no moving parts, weighs but 18 lb, and will not become clogged. Installation and use are simple; Two $2^{1}/_{2}$-in. soft hose lines are run from the pumper to the Accel-O-Rate which is submerged in the water supply. When the pumper takes suction after priming, the driving water going through the jet entrains additional water which is returned to the suction side of the pumper. Complete information and descriptive literature from Jet Pump Division, Derbyshire Machine & Tool Company, 5215-G Belfield Ave., Philadelphia 44, Pa.

## Truck Mixer

One of the revolutionary features of the Jaeger 1946 model truck mixer is a water system which insures fast, uniform distribution of the specified mix-water to the batch under all operation conditions. This is accomplished by the development of a positively clog-proof water jet which solves a long-standing problem in high discharge truck mixers where the water outlet is submerged in the material and subject to clogging by grout. Pressure for the water line is supplied by a standard Jaeger "Sure Prime" Pump. By providing in a minimum of time the complete delivery of batch water which is necessary before proper mixing can take place, Jaeger insures thorough mixing and uniformity of the concrete even on shortest hauls.

Use of positive pump pressure also permits eliminating the awkward overhead tank required with gravity operation. Mix and flush water tanks are now mounted solidly on the main frame, protected from distorting stresses which affect accuracy of measurement, and permitting the entire front end of the truck mixer to be enclosed for weather protection and winter warmth. New 1946 catalog, describes many improved features in Jaeger Truck Mixers. The Jaeger Machine Company, Columbus 16, Ohio.

Lift bridge carrying the A. C. L. railway tracks over the tail race of Santee-Cooper Dam, near Moncks Corner, S. C.

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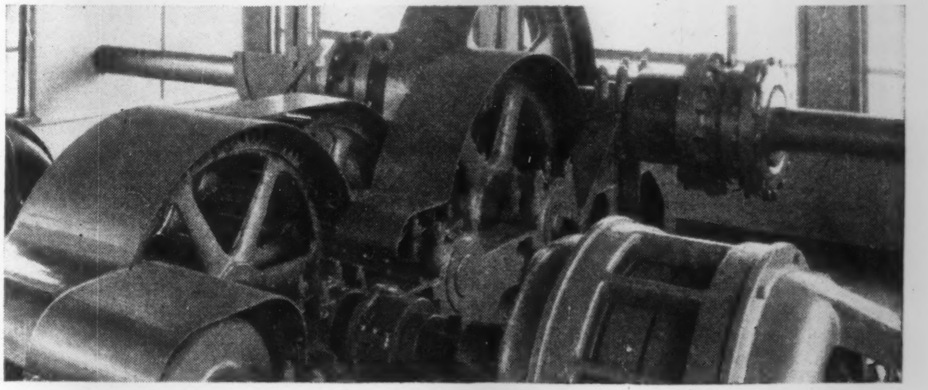

## Sound Motion Picture "Installing Cast Iron Pipe" Offered Local Sections

The Cast Iron Pipe Research Association presents this new sound motion picture as its contribution to good practice in the handling and installation of pipe for underground mains.

The purpose of this film is to show accepted, generally followed methods of handling and installing cast-iron pipe and to illustrate the difficulties that may be encountered if careless or unsound practices are used. Consequently, the picture begins at the pipe yard of a typical foundry; shows the pipe being examined before being loaded on freight cars; illustrates the care exercised in loading, and subsequent unloading onto trucks at the freight station; receipt for delivery in good condition after inspection at the freight station; distribution of the pipe at installation site; trenching operations; and the laying, jointing, inspection, testing, chlorination, and backfilling of an actual installation of 8-in. cast-iron pipe for a water distribution main.

It runs for about 22 min and is furnished on 16-mm film. This educational film is available to the Local Sections of the ASCE, to its Student Chapters, and to municipal departments; no charge except the transportation cost when the film is returned. Address requests to Thomas F. Wolfe, Cast Iron Pipe Research Association, Peoples Gas Building, Chicago, Ill.

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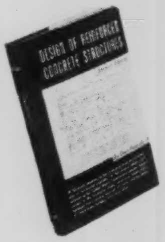

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## Literature Available

BRONZE ALLOYS—A 48-page reference book on Bronze Casting Alloys has been published by American Manganese Bronze Company, 4716 Rhawn St., Philadelphia, Pa. In it is given general information regarding composition, characteristics, and applications of many of the common or typical alloys. The book will help the engineer or designer in the selection of the right alloys for any general application.

BULLDOZERS—Recent newcomers in the "Caterpillar" line of products, the No. 8S and No. 7S (straight-type) bulldozers, for exclusive use with "Caterpillar" Diesel D8 and D7 Tractors, are featured in a new broadside, Form 9198. The publication outlines the features of: balanced design; unexcelled digging characteristics; ease of mounting and dismounting; correctly curved moldboard; reinforcing plates for pusher loading and to back up cutting edge; easily made blade pitch and tilting adjustments; rigidity; long life and sheave support arrangement eliminating the A-Frame structure.

CATERPILLAR PRODUCTS—Telling the story behind outstanding performance is Manufacturing Excellence, a 16-page illustrated booklet, Form 9355, published by Caterpillar Tractor Co., Peoria 8, Ill. The publication teams performance records of the finished product with the manufacturing details which go to make it and portrays, editorially and pictorially, many of the manufacturing machines, processes and details which develop "Caterpillar" products. The illustrations include pictures of the finished products in their various fields of operation, where the values of manufacturing methods are tested under the stress of the job.

CONCRETE MIXERS—The new Rex 11S and 16S concrete mixers are described in bulletin #481 published by Chain Belt Company, Milwaukee 4, Wis. These new machines feature portability, high production, low over-all cost, dependability, easy operation, and streamlined appearance. Mechanical details such as 3-way mixing action, chain drum drive, shimmy skip, accurate water system, one man hitch, etc., are plainly illustrated and described. Complete specifications on all parts of the mixers are also included.

CONVEYOR BELTS—Providing a wealth of information on conveyor belts, the B. F. Goodrich Company, Akron, Ohio, has issued a new "Guide to the Selection of Conveyor Belt Grades." The publication discusses differences in various grades; outlines the reliable measurements of qualities in various type belts and the services for which they are applied.

CORROSION OF STEELS—A 16-page 6 × 9-inch booklet just published by Carnegie-Illinois Steel Corporation and other subsidiaries of United States Steel Corporation, indicates how various commercial steels may reasonably be expected to resist the attack of atmospheric corrosion in particular. The summary, brought up to date by Dr. John Johnston, Director, Research Laboratory, United States Steel Corporation, includes only information now accepted as reliable.

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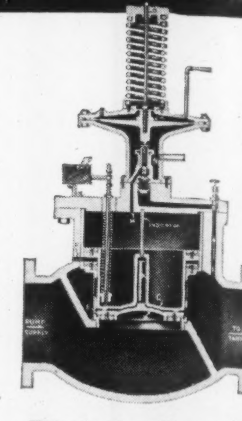
GOLDEN-ANDERSON
ALTITUDE VALVES



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Installed where a single line is used for both supply and discharge, the value will maintain a constant water level within 3" to 12" variation and by means of the "stop-starter" switch stops the pump as the valve closes.

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... with motors that have plenty of style!

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Municipalities aren't the only ones who must depend completely on reliable, large-scale water-pumping service. Many process industries rely on a continuous supply of water to keep output at peak level. This industrial plant, for example, required a flow of 78,000 gpm, pumped against a head of 180 feet. Most of the water was to be used for chemical processing on a continuous basis. Any lengthy interruption in service would jam production disastrously. In addition to getting the utmost reliability, the plant engineers wanted motors that would look as well as they behaved.

We were asked to help in preparing motor specifications. The heavy pumping load involved, plus the need for power-factor correction, pointed to the use of synchronous motors. G-E engineers recommended a 900-hp, 900-rpm, hollow-shaft synchronous motor for each of the five pumps. To meet an external thrust of 40,000 lb, two special angular-contact, ball-type thrust bearings were furnished with each motor. An important safety feature was the addition of non-reverse ratchets to prevent reverse rotation of the pumps, caused by turbine action, when the motors were shut down.

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HYDRANTS: Standard A.W.W.A. type approved by Underwriters and Factory Mutuals. Dry top, revolving head, easy to lubricate. High efficiency because barrel diameter not reduced and there are no working parts or obstructions in waterway. SPECIAL TRAFFIC MODEL is designed to yield at ground line under impact, repair being simply renewal of breakable bolts and breakable coupling on stem.

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CRANES—A new 6-page folder, Form No. C-633, describing various on- or off-the-road uses of the Tournacrane shows this unit's wide range of industrial adaptability. The new folder presents on-the-job photographs of various Tournacrane applications—ranging from oil storage tank installation to culvert placing. R. G. LeTourneau, Inc., Peoria, Ill.

DEMINERALIZERS—The process of preparing clear water, the equivalent of commercially distilled, by ion exchange is described in Cochrane Corporation's new Bulletin 4181—"Cochrane Demineralizers." This new method of preparing clear water for process offers opportunities of economies and improved products wherever there is a need for mineral-free water. The bulletin describes the process in simple language, accompanied by illustrations and chemical reactions of the ion exchange process. Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32, Pa.

DIESEL ENGINES—The Buda Company, Harvey, Ill., has recently published a 12-page catalog featuring its new line of "One-Sixty-One" Series Diesel engines for Automotive, Industrial, and Marine service. Illustrations show 1, 2, 3, 4, 6, and 8-cylinder models, ranging from 15 to 300 horsepower. The heavy-duty six- and eight-cylinder Diesels are available in both standard and supercharged models.

DITCHING AND TRACK MAINTENANCE—A clear conception of the Jordan Spreader-Ditcher-Snow Plow in action and the wide range of its usefulness in railway maintenance is given in a new book of 24 pages. It shows the spreading of rip rap and other material, shaping ballast, ditching, moving fill, scarifying and snow removal. O. F. Jordan Company, East Chicago, Ind.

DOZER-SHOVEL—A new 24-page bulletin describing the Dozer-Shovel for International TracTracTors has been issued by Bucyrus-Erie Company, South Milwaukee, Wis. Colorfully illustrated, the new bulletin graphically depicts actual operating conditions on a wide variety of digging, earthmoving, and material-handling jobs. It also describes the features of: low overhead clearance and generally compact design; high visibility; maintenance of tractor balance; smooth hydraulic control; and easy interchangeability.

DUMP BODIES AND HOISTS—Four new bulletins on Heil Bodies and Hoists are available on request to The Heil Co., 3000 W. Montana St., Milwaukee 1, Wis. They are: BH-4534—Heavy duty dump bodies and twin cylinder hydraulic telescopic hoists; BH-4550—Twin arm hoists for heavy duty trucks; BH-4533—Twin arm hoists and bodies for 1 1/2 to 2 1/2 ton trucks; and BH-4549—Platform Conversion Hoists.

ELECTRODES—Eccles & Davies Machinery Co., Inc., Los Angeles, Calif. has issued a 16-page, two-color booklet which describes in detail the physical and chemical properties of phosphor bronze electric welding rods. It gives uses and techniques for welding copper, bronze, cast iron, steel, and their alloys.

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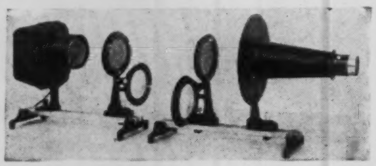

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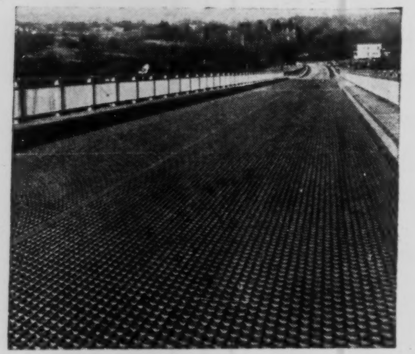

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PH EQUIPMENT—The Bristol Company, Waterbury 91, Conn., has announced a new bulletin, No. pH1302, describing Bristol Continuous pH controllers and Recorders in detail, including electrode assemblies and accessories. The bulletin includes engineering and technical information relative to pH theory and measurement. A variety of actual installations are described; with chart records, photographs, and flow diagrams included.

FLOW RATE MEASUREMENT—Operation of W-K Principle in combination with Simplex MO Meter clearly described and illustrated. MO Meter accurately indicates, records and totalizes flow rate measurement of Differential Taps in Water Turbine. Taps are placed on turbine installations already operating, as well as within new constructions. Bulletin 420, Simplex Valve & Meter Co., 6724 Upland St., Philadelphia 42, Pa.

HIGHWAY MAINTENANCE—To familiarize maintenance men with the early recognizable signs of pavement slab pumping, and to describe a method of stopping this action, the Koehring Co., Milwaukee, 10, Wis., has published a 20-page booklet entitled "How to Detect and Correct Pavement Slab Pumping."

MANOMETERS—Bulletin No. 200 describes completely the line of Simplex fixed and portable manometers for use in water surveys and similar flow rate measurement. Engineering data on manometers is included. Simplex Valve & Meter Co., 6724 Upland Street, Philadelphia 42, Pa.

MINING—"Fabricated Steel Products for the Mining Property" is the title of an 8-page illustrated booklet published by Armco Drainage & Metal Products, Inc., 1720 Armco Ave., Middletown, Ohio. Armco Tunnel Liner Plates are described for slope entries, haulways, escapeways, air shafts, substations, and overcasts. Standard Steelox Buildings in widths of 8 to 25 ft are recommended for buildings, shops, garages, and other purposes. Other products include: welded steel pipe and fittings, quick-coupling portable pipe, corrugated arches, corrugated pipe, retaining walls, guard rail, sheeting, bridge deck, and smoke jacks.

MIXERS—The new streamlined Rex 6S mixer, the Rex 3½S end discharge tilter, and the Rex skipper are pictured and described in Bulletin No. 480 published by Chain Belt Company, 1600 W. Bruce St., Milwaukee 4, Wis. Many new machine innovations are emphasized by small sketches and large illustrations show the main mechanical features. Two pages carry a composite set of specifications on the three mixers.

SPEED REDUCERS—A new sixteen-page bulletin entitled "Earle Speed Reducers as Applied to Operating Machinery," containing useful engineering data and information of value in selecting the proper reducing unit for various needs. Fully illustrated, showing installations in movable bridges, ferry lifts, gates, dams, and other types of machinery. The Earle Gear and Machine Co., 4707 Stenton Avenue, Philadelphia 44, Pa.

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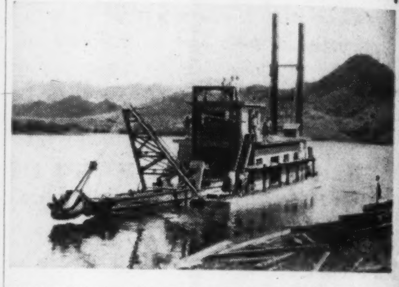

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